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Northern Pacific Railroad

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IN THE SENATE OF THE UNITED STATES.

DECEMBER 17, 1867.—Ordered to be printed.

Mr. RAMSEY submitted the following

MEMORIAL, &c.

NORTHERN PACIFIC RAILROAD.

Memorial of the board of direction of the company, communications from Lieutenant General Grant, Brevet Major General Meigs, Q. M. G., and Brevet Major General Ingalls, A. Q. M., and report of the engineer-in-chief, November, 1867.

To the Senate and House of Representatives of the United States in Congress assembled :

The undersigned, president and directors of the Northern Pacific Railroad Company, respectfully represent that Congress, in 1864, granted the original charter to their company. The line of road thus authorized extends from a point near the west end of Lake Superior to Puget sound, with a branch to the valley of the Columbia, near Portland, in the State of Oregon; thus spanning the continent from navigable waters on the east to navigable waters on the Pacific coast, and extending over a territory of great natural wealth, and affording unusual facilities for travel and commerce.

The corporators organized under their charter in the summer of 1864, and being deeply impressed with the importance of the enterprise, immediately inaugurated measures to provide funds for the construction of their road. But notwithstanding the many favorable provisions in their charter, including a liberal land grant, it was found impracticable after the most diligent and persevering efforts to induce capitalists to embark in the enterprise.

This indisposition to invest money in a road admitted to traverse a territory possessing a salubrious climate, and a fertile soil abounding in mineral wealth, and presenting unusual facilities for construction, on a line which must ultimately make it a great thoroughfare for continental travel and commerce, arose from the fact that the lands granted were mainly located remote from the settled portions of the country and were little known to the public, and therefore much time and labor would be required to convert them into money, or to realize returns in the form of dividends from the business of the road.

The indisposition to invest in this enterprise was further increased by the additional fact that other roads leading to the Pacific were able to offer not only the security of land grants but also the bonds of the United States and their own bonds secured by mortgage, and having priority of those issued by the government; neither of which could this company, under its existing charter, offer.

After an ineffectual struggle of nearly two years to raise funds for the prosecution of the enterprise, other parties were induced to come in and aid in carrying it forward.

Application was made to Congress by the company in 1866 for aid in the form of a guarantee of interest on a limited portion of the stock of the road for a term

of years, under the belief that with such temporary assistance it could be constructed.

This form of aid was new, and by many deemed inadequate for the purpose desired, while the more common form of bonds, which had already been adopted by the government in similar cases, had proved eminently safe and effectual. For these, and perhaps other reasons, Congress failed to grant the solicited aid. With this action we are entirely content, as we are now fully satisfied, from the most careful consideration and inquiry, that had the bill then before Congress become a law, it would not have proved successful in operation.

Early last spring the company adopted efficient measures for a thorough examination and survey of the route indicated in our charter. For that purpose the services of Edwin F. Johnson, esq., an eminent engineer, who had held the first position on several leading railways of the country, and who had given much attention to our proposed line, were secured. He at once organized and put into the field four separate corps of engineers. Two parties commenced at different harbors on Lake Superior, running lines westerly to a common point west of the Red River of the North, thence to be extended along the valleys of the Missouri and Yellowstone, and across the Rocky mountains to and through the valley of the Columbia.

The other two parties were despatched to the Pacific coast, with instructions carefully to examine and survey the passes in the Coast range of highlands, between the Columbia river and our national boundary, for a direct line to Puget sound; and also to locate a line from near Portland, in Oregon, up the valley of the Columbia eastward.

All of these parties have been actively engaged in the field during the entire season, and will continue in the prosecution of their work as long as the weather will permit. Their labors have proved highly satisfactory. The report of our engineer-in-chief, a copy of which we herewith submit, and to which we respectfully invite your attention, will present the result of their explorations and surveys, together with much other valuable information, illustrating the character of our enterprise, collected from the most reliable sources.

In support of the bill now before Congress, providing aid for the Northern Pacific railroad, we do not intend to present an argument, but may, we trust, be pardoned for making the above statements and for a few additional suggestions.

The aid which we desire is not new. If granted it will establish no untried precedent. Already Congress has rendered similar aid to other corporations under like circumstances, with the most beneficial results.

The road which we propose to construct is not a rival of any other Pacific railroad. It occupies other, distant, and entirely different ground, and is designed to develop other and not less important interests, and to accommodate other and not less numerous nor less deserving people, who, as far as we can perceive, are equally entitled to the favorable consideration and aid of the government.

The territory traversed by this road is of vast extent, and capable of adding illimitable wealth and almost countless population to our nation. Though now in a state of nature, its extended plains are generally covered with verdure and teem with animal life, its stately forests abound with valuable timber, and its mountains and hills are filled with mineral wealth.

The line passes through valleys scooped out by the hand of nature, and gateways where the mountains have been cleft to their base by the great Creator, thus opening a highway for the passage of the nations.

The gradients on this line are much easier than on any other across the continent; and it is the shortest existing or projected route between the great marts of commerce in western Europe and eastern Asia.

To the government the construction of this line will be of incalculable value. The transmission of the mails to Oregon, and the Territories of Dakota, Montana, Idaho, Washington, and Alaska, our newly acquired territory, in the northwest, to say nothing of other countries, would alone authorize the government to render substantial aid in its construction.

In a military view it is still more important. Situated upon an extended and unprotected frontier, contiguous to a country now under the dominion of one of the most powerful and warlike nations of the world; traversing a territory occupied or overrun by numerous tribes of Indians, often hostile, never entirely trustworthy, it will be invaluable in times of danger for the rapid transmission of troops and munitions of war.

These considerations appeal to the immediate and certain necessities of the government. Upon this point we would most respectfully call the attention of Congress to the accompanying letters of Generals Grant, Meigs, and Ingalls, which, though written more than a year ago, are none the less appropriate and pertinent at this time.

Nor does the demand for postal and military service present the only or chief reason for the early construction of this road. As has already been remarked, it passes through a territory vast in extent and rich almost beyond conception in vegetable and mineral wealth, and, though now unoccupied or sparsely populated by civilized man, is capable of sustaining an immense population and of adding millions to our national wealth.

The population which the construction of this road will invite from abroad, and the increased wealth that will be sure to follow, will pay, and many times over pay, in taxes, all that the government is desired to contribute, even should it not be indemnified by the company for its advances, to say nothing of the direct profits it will realize in the enhanced value of its lands by having them thus brought into market. These considerations would at any time be entitled to great weight, but they commend themselves with increased force at this time, when our nation is burdened with debt and our people are struggling under an accumulation of taxes—the price which we are paying for the boon of national unity and personal freedom.

Nor should we be unmindful of the influence which the construction of this road will have upon our northern neighbors, who inhabit adjoining territory of great extent, and exceeding richness and fertility. It will open to them the best, most direct, and most inviting avenue of commerce. They are of our own race, a people of great enterprise and intelligence, and in sympathy with us, and are already stretching out their hands to join us.*

The lands which they occupy lie between us and our newly acquired territory in the north. Commercially and socially this people are of us. Geographically and politically they should not be separated from us. No more certain, and certainly no less objectionable method for bringing us together can be devised than by affording them the additional facilities of railroad communi-

*A petition now in circulation among the people of Vancouver's Island and British Columbia to the home government, contains the following significant language:

"That we humbly submit to your Majesty's gracious consideration, as the only policy to bring prosperity back to our homes, viz: Either that your Majesty's government may be pleased to relieve us immediately of the expense of an excessive staff of officials, assist the establishment of a British steam line with Panama, so that emigrants from England may reach us, and also assume the debts of this colony, or that your Majesty will graciously permit the colony to become a portion of the United States.

"That every feeling of loyalty and cherished sentiment of our hearts prompt us to cling to our present connection with our mother country, and to count as our best inheritance our birthright as Britons; but all our commercial and business relations are so intimate with the neighboring American population, that we see no other feasible help out of our present difficulties than by being united with them, unless your Majesty's government will help us as aforesaid."

cation with our people and our commercial centres. This will increase the gravitation of interest, which is even now strongly toward us, and afford greater security against hostile action on the part of those who now govern that country than can be found in fortifications filled with munitions of war and defended by armed men.

Then, again, the construction of this road will connect, and add vastly to the availability and usefulness of our lake and river system, which, on its line, almost spans the continent with navigable water. The construction of 825 miles of road will open a passage, by navigable water and rail, from New York city, the great commercial emporium of the country, to Portland, near the mouth of the Columbia. This will appear from the following table :

	Water.	Rail.
New York to Albany	150 miles.	
Erie canal	350 "	
Buffalo to Superior City	1,000 "	
Superior to Missouri river	485
Missouri river to Grand falls	500 "	
Grand falls to navigable waters on Flathead and Clark's rivers	200
Navigation on latter	175 "	
Clark's river to Lewis river, mouth of Paluse	140
Lewis and Columbia rivers to Portland	225 "	
	<hr/> 2,840	<hr/> 825

And this only shows a portion of the navigable waters which the construction of 825 miles of this road will connect and make more available. The line crosses and opens the navigable waters of the upper Mississippi, the Red River of the North, and through it the Assiniboin, the Saskatchewan and Lake Winnipeg; also the Missouri below its crossing, the Yellowstone, the Big Horn, and numerous others, draining large and fertile valleys, and will thereby at once afford cheap transportation for the less concentrated productions of the country, while the final completion of the entire road will insure, at no distant day, rapid transportation of passengers and valuable merchandise. Thus will be united in this line, as can be in no other trans-continental line, both cheap transportation and rapid communication.

In these brief suggestions we have presented you with no speculative or detailed statistics of the business that will be transacted on this road when completed; for who can, by figures, measure the business of such a region, when fully developed? We have not dwelt upon the wonderful evenness of a large portion of our line, graded, as it were, by nature; of the slight elevation of the mountain passes; of its freedom from obstruction by snow; of its general directness, and consequent shortness; of the salubrity of its climate, and of its favorable location for continental and inter-continental communication. On these subjects, if special information is desired, it may be found in the accompanying report of our engineer. Our only object has been to call your attention to the prominent features of our enterprise, and to place within your reach more specific information if desired.

But it may be said that our suggestions may all be true; that the enterprise may be all we claim for it; yet, can the government in its present condition afford to render the desired aid? We answer, emphatically, yes; or, rather, we ask in return, *can the government afford to withhold the desired aid?*

The provisions of the bill are such as to preclude the possibility of the loss of a single dollar by the government. We do not believe it will at any time be in advance, in money payments, for the company. Its experience with other Pacific roads to which it has advanced its credit, under circumstances certainly

not more favorable than now asked by us, demonstrate this. In the last report of the Union Pacific railroad, made as late as October 25, 1867, speaking of the bonds advanced to that corporation by the government, it is said :

"The interest on these bonds is paid by the United States treasury, but is a charge against the company, which is much more than paid by services rendered the government in transporting its troops, freight, mails, &c. This service, since April of the present year, has amounted to over four and one-half times the amount of interest. By its charter the company receives one-half the amount of its charges against the government in money, and the remaining half is placed to its credit, as a sinking fund, which may amount to a sum sufficient to retire the whole amount of government bonds at maturity."

It is understood that the experience of other branches of the Union Pacific road has been equally favorable, and no reason can be perceived why the result upon the Northern Pacific road should not be at least as favorable.

What we now desire is the indorsement of the government substantially as furnished to other and similar roads, *as a basis of credit*, to enable us to bring out, and make available, the resources which we already possess under our charter. With the aid of that credit, we have undoubted confidence in our ability not only to construct the road, but also to save the government harmless from all loss, and add largely to the population, power, and wealth of the nation.

Never in the history of the world were the industrial classes of Europe so dissatisfied with their condition as now, and never was the desire of those classes so strong to emigrate to America as at the present time. The territory traversed by our road presents strong attractions for this population. Its climate is congenial; its soil, mineral resources, and facilities for manufacturing will afford this people the precise employment to which they are adapted. It is this class of people that filled up and developed the western States with such wonderful rapidity, and such great advantage to the nation. And the question is now presented, shall we by a liberal policy invite this inflow of population, with its accompanying wealth, to contribute to our resources, and aid in the discharge of our national burden, or shall we, by withholding timely aid, devote this great and goodly land still longer to the occupancy of wild beasts and savage men? We think it plain that the interests of the nation require that the liberal policy should prevail, for in public as in private affairs, "There is that scattereth and yet increaseth; and there is that withholdeth more than is meet, but it tendeth to poverty."

To the development of this great enterprise we propose to devote ourselves with the utmost assiduity, and we hope with entire success.

J. GREGORY SMITH, *President.*

RICHARD D. RICE,
WM. B. OGDEN,
J. EDGAR THOMPSON,
GEORGE W. CASS,
WM. G. FARGO,
ROBERT H. BERDELL,
BENJ. P. CHENEY,
ON-LOW STEARNS,
THOMAS H. CANFIELD,
JAMES C. CONVERSE,
LORENZO D. M. SWEAT,
PHILANDER REED,

Directors.

NEW YORK, November, 1867.

Communications from Lieutenant General Grant, Brevet Major General Meigs, Q. M. G., and Brevet Major General Ingalls, A. Q. M., in reply to a committee of citizens of the northwest.

COMMISSIONERS' OFFICE, NORTHERN PACIFIC RAILROAD CO.,
Washington, D. C., March 29, 1866.

GENERAL: I take the liberty of sending herewith copies of the charter of the Northern Pacific railroad, of a report of a committee of the Boston Board of Trade upon the same, and of the bill now pending before Congress in its aid. The management of the board has recently passed into new hands—men who are able to carry the enterprise through, both financially and in point of engineering skill and experience. A list of the officers and directors accompanies this.

Learning that it is not now practicable to obtain from your department actual statistics of the expenses incurred by the United States during the last few years in the transportation of troops and stores within the Territories through which the route of this proposed road passes, I ask the favor, on behalf of the committee appointed by a meeting of citizens of these Territories to memorialize Congress in favor of this bill, that you will state to us your general views upon the value of this road to the government, in a military point of view, both as affecting the cost of transportation and affording the means of frontier defence. The different aspects which this topic presents will suggest themselves to your mind more readily than to ours, and I therefore forbear to enter upon details. I will only say, that the greater the latitude which your leisure will permit, the more agreeable will it be to us.

Very respectfully, your obedient servant,

GEORGE GIBBS,

Chairman Committee on Memorial.

Brevet Major General MONTGOMERY C. MEIGS,

Quartermaster General U. S. Army.

WASHINGTON, D. C., April 18, 1866.

DEAR SIR: I have read the documents in behalf of the Northern Pacific railroad, which accompanied your letter of the 29th of March. I have not the time to make an extended examination into the questions which you propose, nor to set forth fully the reasons which induce me to look with great interest to the early construction of a line of railroad to the Pacific along the northern portion of the western domain of the United States.

I am informed by Major General Sherman, commanding the military division of the Mississippi, who is now engaged in providing for the protection of the traffic and travel to the northwest, that it is estimated that *one hundred thousand persons* will cross the plains this year. The recent discoveries of gold in Montana, Idaho, and other mountain districts, have attracted attention to these lately unexplored regions. A town of four thousand inhabitants has sprung into existence at Helena, on the Missouri, nearly one hundred miles above Fort Benton, the old trading post on the head-waters of that great river. At Blackfoot City, Gallatin, and other points, settlements are being made. The country holds out to explorers without capital the rich rewards which attracted so many miners to the California gold fields before the placer diggings were exhausted, and a strong tide of emigration is now pouring into Montana.

Much of the country along the route of the Northern Pacific railroad is reported by the late Commissioner of the Land Office, Hon John Wilson, as productive and well suited to agriculture. The climate, owing to the peculiar trend of the isothermal lines, affected by the currents of the Pacific, is far less severe

than those who live on the Atlantic coast are led to infer from their experience of the rapid increase of cold with each increase of northern latitude in New England, and in the valley of the Mississippi and the lakes.

The statement of the climate, derived from the report of Governor Stevens and other observers, cited in the address of the senators and representatives of the northwest, urging this railroad upon the attention of the country, is in striking contrast with the climate of the more southern mountain regions of Arizona. General Halleck, in a despatch lately received, states that at Fort Whipple, Arizona, which is in about thirty-six degrees north latitude, the snow during the past winter has been five feet deep, and the thermometer fourteen degrees below zero for weeks together. On the Columbia river, a traveller, Mr. A. D. Richardson, writes to the New York Tribune, in February, that he found roses in bloom ten degrees further north.

I am convinced that there is no difficulty to be apprehended from the rigor of the climate, or the depth of the snow, in the working of the Northern Pacific railroad, which has not been met successfully and overcome in the construction and regular daily working of railroads in the States of Maine and New Hampshire, Vermont, Michigan and Minnesota, and in Upper Canada, along the line of the Grand Trunk.

Of the advantages to result to the country from the speedy opening of railroad communication along the contemplated line, it is hardly necessary for me to speak. I can add little to the argument so well set forth by the senators and representatives of the northwest in their appeal to Congress of the ninth of this month.

Heretofore the War Department has not had any considerable interests to protect in the northern central region, for whose development and protection this road is now so urgently needed.

The country had been little explored or visited by our citizens. It had been in a great degree given up to the operations of the Hudson's Bay Company, who, seeking not settlement, civilization, and improvement of the country, but rather the increase and collection of the products of the chase, are not brought into collision with the warlike tribes who have ranged through the mountains and valleys.

The trading posts occupy but little of the territory. They offer a good market for the furs and peltries brought in by the savages; they supply the hunters with arms, ammunition, traps, and the few articles of civilized manufacture which go to make the scanty artificial luxuries of the savage state. They interfere, therefore, little with their customs and prejudices, and can cultivate and preserve with them friendly relations. Our people appropriate the soil; they move in large companies and trains, disturbing the game. They occupy the pasture lands upon which some of these tribes now pasture thousands of cattle and horses. They doubt and dispute the Indian who has been at war with their forefathers since the Pilgrims first landed on the shore of New England; and looking upon him as a wolf, not to be trusted whenever it is to his advantage to attack the white man, quarrels and violence are inevitable. These will compel the United States to place troops in the country; to establish posts of succor and refuge; and the same course of events which has led to the immense expenditure for transportation upon the route of the Utah and to New Mexico, is certain to come in the near future on the routes to Idaho, Montana, and the valley of the Columbia. What this expenditure is likely to become in a few years, may be judged of in some degree by reference to what it was in the year ending June 30, 1865, as set forth in the annual report of the quartermasters' department for that year:

TRANSPORTATION OVER THE PLAINS.

The troops operating on the great western plains, and in the mountain regions of New Mexico, Colorado, Utah, and Idaho, are supplied principally by trains of the quartermasters' department from depots established on the great routes of overland travel, to which depot

supplies are delivered by contract. The contractors are the freighters or merchants of the overland trade. This department has not statistics to show the extent of this traffic, but it has of late years increased with the development of the mines of the central regions of the continent, until it has become a most important interest.

Travellers by the stage from Denver to Fort Leavenworth, a distance of six hundred and eighty three miles, in the month of July, 1865, were never out of sight of wagon trains belonging either to emigrants or to merchants who transport supplies for the War Department, for the Indian department, and for the miners and settlers of the central Territories.

The cost of transportation of a pound of corn, hay, clothing, subsistence, lumber, or any other necessary from Fort Leavenworth—

	Cent
To Fort Riley.....	2 46
To Fort Union, the depot for New Mexico.....	14 35
To Santa Fé, New Mexico.....	16 85
To Fort Kearney.....	6 44
To Fort Laramie.....	14 10
To Denver City, Colorado.....	15 43
To Salt Lake City, Utah.....	27 84

The cost of a bushel of corn purchased at Fort Leavenworth and delivered at each of these points is as follows:

To Fort Riley.....	\$2 79
To Fort Union.....	9 44
To Santa Fé.....	10 84
To Fort Kearney.....	5 03
To Fort Laramie.....	9 26
To Denver City.....	10 03
To Great Salt Lake City.....	17 00

(To this last point none is sent.)

The expenses of this department will be reduced by the advance of the Pacific railroads, two of which are rapidly moving westward—one from Leavenworth toward Fort Riley, the other from Omaha toward Fort Kearney.

The present general mode of transport is by heavy wagons, each drawn by ten oxen. The loads of these wagons average fifty-five hundred pounds each. Lighter freight and passengers are carried by express in lighter wagons, drawn by mules, which animals are almost exclusively used in the winter, when the grass is covered with snow.

The heavy trains in dry weather move readily over the prairie roads, which, outside the limits of the settlements, follow the best routes and make wide detours to avoid the sloughs or wet places in the prairies.

The progress of settlement injures these roads. No laws appear to exist reserving the road-bed on these great overland routes to the public.

The lines of survey of the public lands cross the trail at all angles, and each farmer is at liberty to fence in the tract according to the unyielding lines of his rectangular boundaries.

The overland trails, now well-beaten wagon tracks, were originally located upon the high and dry swells of the prairie, the most desirable lands for agricultural purposes. They followed the best routes, and sought the easiest crossing of streams, low grounds, and swamps. Near Leavenworth, the progress of enclosure is driving them into the wet grounds, and greatly increases the difficulties of travel.

It is much to be desired that in all future land sales, the great and long established trails—the highway across the continent—should be reserved from sale, and be devoted forever as public highways. A certain width on each side of them should be marked out by actual survey and reserved for this purpose. Wagon roads across the continent will always be needed, even when the railroads are completed.

The following is an estimate of the cost of transportation of military stores westward across the plains by contract during the fiscal year ending June 30, 1863:

I. Northern and western route:

To Utah and posts on that route.....	\$1,524, 119 00
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II. Southwestern route:

To Fort Union, New Mexico, and posts on that route.....	\$1,301, 400
To posts in the interior of New Mexico.....	138, 178
	<hr/>
	1,439, 578 00

Cost of the transportation of grain on above routes, where the grain was delivered by contractors and the transportation entered into the price paid the same year:

I. Utah route.....	\$2,526,727 68
II. New Mexico route.....	697,101 69
	<hr/>
	3,223,829 37

Cost of transportation of military stores across the plains same year by

Government trains:

I. Utah route.....	\$34,600 00	
II. New Mexico route.....	166,730 00	
		\$201,330 00
Total by contract and government trains.....		6,388,856 37

This expenditure would be reduced by the opening of railroads by a sum that would aid materially in paying interest upon the cost of their construction.

The present season has been a very wet one upon the plains. In wet weather the heavy wagons are generally compelled to go into camp and wait patiently till weather makes the roads practicable. Any effort to move exhausts the animals and destroys the wagons, while the progress of such a train would not average, in bad weather, over many portions of the road, one mile a day. Trains from Fort Leavenworth to Denver City have this year occupied from forty five to seventy-four days in the march.

The distances to the Northwest are great; the interior and local transportation will be as costly. The use of the Missouri river, however, will enable the government to place a large part of its supplies upon the upper waters of that river, by taking advantage of the summer rise, and thus the extent of land transportation will be reduced.

But, until the Missouri valley itself is settled, the navigation will continue to be slow and perilous. Steamers are now obliged to stop from day to day to cut green cottonwood or drift-wood upon the banks, and a trip to the Upper Missouri is a season's work. Many boats are wrecked; some are caught by the falling waters, and compelled to winter on the upper river.

Insurance to Fort Benton, the head of navigation, costs twenty per cent.; and the government has this year been obliged to engage freight from St. Louis to Forts Berthold and Union, old trading posts now about to be occupied by troops as military posts, at five dollars per hundred pounds, or one hundred dollars per ton. Fort Union is, in a direct line, 330 miles below Fort Benton. By the river, the distance is probably one-half greater.

From Fort Union the supply of the troops and posts throughout Montana and the districts supplied from the east will be by wagon trains.

On the well-travelled and well-guarded routes of the central and southwestern overland trails, the cost of this transportation by contract last year averaged forty-five cents per ton per mile. The contracts for the present year are at much lower rates, but in the remote districts of the Northwest such favorable rates cannot be expected as yet.

The distance from St. Louis to Fort Benton by river is estimated at 3,450 miles by river men. The cost of transportation of freight to that point is \$350 to \$400 per ton. From St. Louis to Helena, a town of 4,000 inhabitants, which has sprung into being in Montana within the past year, the estimated cost of transportation of freight by the river and wagon trail is \$500 to \$600 per ton.

From Salt Lake to Helena, a distance of 560 miles, the cost of wagon transportation at present is stated at \$200 per ton. How much must these enormous rates interfere with the opening and development of the rich mining, grazing, and agricultural regions of this Switzerland of America.

These rates are applicable to the tools of the miner and of the farmer; to the sugar, flour, salt, and other articles of food not yet produced in the Territory; to the clothes they wear; the iron and steel needed in every occupation in life; to the books and periodicals which, with our educated population, are also necessities of daily life.

The Oregon Steam Navigation Company, with most commendable enterprise and foresight, have placed steamers upon the Columbia river and its branches, built short railroads at the several portages, and are now constructing steamers on Pend d'Oreille and other lakes, and upon the upper Snake river. They open a route to the interior regions from the Pacific coast, and by their route

the gold and furs—the only exports of the country at this time—reach the Pacific, and supplies are sent to the miners.

But the great reservoir from which man and all his necessary supplies are drawn is yet, and for years to come must be, the Mississippi valley and the Atlantic coast. The territories of the Pacific coast are to be filled by emigration; they have, as yet, no great manufactories and no redundant population. The route needed for the opening and improvement of the country is the route from the east.

The grants of land made by Congress for this object are liberal, and are sufficient, in time, probably, to construct the road. *But men die—nations live.* Men cannot take their capital, the accumulated fruit of years of industry, and devote it to the construction of a great public improvement, and wait years for the returns. They prefer enjoying the present use of their fortunes to investing their means in enterprises which will make large returns only after their death.

The nation is lasting. The opening of every new route, the enclosure and cultivation of every acre of wild land, contribute immediately to the revenue and resources of the nation; and no means of improving the great national domain, of increasing by its products the national revenue and prosperity, can compare in cheapness and efficacy with the opening of rapid communication by railway with these distant, healthful, and productive regions.

The country is one fitted to be the home of a hardy race; one in which the principles of liberty and the spirit of enterprise and industry will live and bear their natural fruits.

The rivers Missouri and Columbia—though the Missouri is closed by ice at low water for a large portion of every year—will be of great value in hastening and cheapening the construction of the railroad. By these rivers supplies, men and materials can be despatched to the vicinity of the most costly and distant portions of the route.

The road should be commenced at many points, especially those which can be reached by either of the rivers. The time needed for construction in a mountain district is much greater than on the level and open prairies.

While its eastern portion should be early begun and pushed forward in advance of settlement, which, however, rapidly follow, if it does not accompany the road, there are sections in the mountains which, operated in connection with the lines of the Oregon Steam Navigation Company's boats upon the Columbia and its tributaries, would, immediately upon their completion, enjoy considerable trade, and aid in developing the country.

To construct these portions of the road, supplies and materials can be sent by the Columbia and by the Missouri rivers.

For the mode of construction I am of opinion, after the experience of the quartermasters' department during the war in reconstructing, stocking, and operating over 1,700 miles of railroad, that it will prove to be true economy of time and money to send by the river, to the most advantageous points of the mountain mineral districts, the workmen, the machinery, and the tools to open mines of coal and iron, to establish saw-mills, rolling-mills, and factories, in which the lumber, the iron, and probably a portion of the rolling stock of the road can be manufactured.

Near these establishments, of course, agricultural settlements would spring up, and in a year or two the cost of transporting, at five or six hundred dollars per ton, iron and food to the workmen on the railroad, and to the railroad itself, would cease.

The quartermasters' department during the war built at Chattanooga a rolling-mill for the purpose of rerolling the rails of the southern railroads, burned and bent by the contending armies, and found great advantage in the operation.

Large quantities of iron go to the construction of bridges and of the railroad track in simple forms. For the manufacture of this at least the rude machinery

of the rolling-mill should be provided, in order to save the heavy expense of transportation from the east.

This would accelerate the opening of the road, avoiding the necessity of building it only from each end.

The increase of wealth and of revenue to be derived from every year, by which the opening of the road can be hastened, may be judged of by the comparison of the revenue of the United States and of the several new States, as effected by the opening of free and rapid communication within their boundaries.

The enterprise is one worthy of the nation. As a military measure, contributing to national security and defence alone, it is worthy the cost of effectual assistance from the government.

The Central railroad to San Francisco will secure that admirable harbor and its trade, and the rich State of California, against all serious danger from a foreign foe.

But our communication with the harbors of the northwest coast, Puget sound, the mouth of the Columbia, and with the growing population of Oregon and Washington, by sea from San Francisco, will be liable to interruption by a hostile fleet. With the Northern Pacific railroad in operation, troops and materials of war could be rapidly sent from the east to succor and defend our rising empire in the northwest.

But the construction of the road will make the now wild and waste regions, through which it is to pass, centres of national wealth and production and military strength, and from the mountains themselves a hardy population will pour down to the coast at every hostile demonstration.

For the mode in which aid can be granted to the construction of this road, none appears to me so effectual and speedy, none to impose so light a burden upon the treasury, as the guarantee of a sufficient rate of interest upon a portion at least of the actual cost of construction. While I should rejoice to see the government itself undertake the construction of the road, with the intention to lease it when completed to a company for a term of years, on condition of its cost being gradually repaid to the government, and have no doubt that such an enterprise would amply repay the people of the country; yet, I presume that, at this time, the public mind is hardly ripe for such an undertaking.

A guarantee of a fixed rate of interest upon the cost of construction, to be repaid in a term of years, is a mode of assistance to their great enterprises now common in the highly developed and heavily taxed countries of Europe. If those governments, burdened with the immense annual expenditure of standing armies, almost as large in time of peace as we have been compelled to support in time of war, find it in the interest of their revenues thus to aid free travel and transport through countries already provided with navigable rivers and excellent wagon roads, we may confidently assume that our country will find ample reward for any such expenditure in opening up a highway for fraternal intercourse between our older communities on the Atlantic and the rising settlements on the Pacific—a highway, too, to which the inevitable laws of commerce will attract the trade of the east—the trade of China, Japan, and India—a trade along whose slow and painful track, when it was conducted by beasts of burden, and by oars and sails, instead of by the iron horse and the ocean steamship, great cities sprung up in the desert sands of Asia, and on the coasts of the Mediterranean.

Babylon, Nineveh, Palmyra, Bagdad, Damascus, Constantinople, Alexandria, Rome, Venice, Genoa, and London are the outgrowth of this trade in former centuries.

The lines of Pacific railway will found such cities in the new, healthful, and inviting regions through which its eastern flow is destined to enrich the world, and Oregon as well as California; Montana as well as Utah, will hereafter have their San Franciscos, Chicagos, St. Louises, Cincinnati, and New Yorks, great

emporium of an internal commerce heretofore unknown, as well as of the world encircling commerce of the Indies.

I am, very respectfully, your obedient servant,

M. C. MEIGS,

Quartermaster General, Brevet Major Gen. U. S. Army.

Hon. GEORGE GIBBS,

*Chairman of Committee on Memorial of a meeting of
Citizens of the Northwest upon the Northern Pacific Railroad*

The foregoing communication from General Meigs having been submitted to Lieutenant General Grant, was returned with the following indorsement:

HEADQUARTERS ARMIES OF THE UNITED STATES,

April 20, 1866.

The construction of a railroad by the proposed route would be of very great advantage to the government pecuniarily, by saving in the cost of transportation to supply troops whose presence in the country through which it is proposed to pass is made necessary by the great amount of emigration to the gold-bearing regions of the Rocky mountains. In my opinion, too, the United States would receive an additional pecuniary benefit in the construction of this road, by the settlement it would induce along the line of the road, and consequently the less number of troops necessary to secure order and safety. How far these benefits should be compensated by the general government beyond the grant of land already awarded by Congress, I would not pretend to say. I would merely give it as my opinion that the enterprise of constructing the Northern Pacific railroad is one well worth fostering by the general government, and that such aid could well be afforded as would insure the early prosecution of the work.

U. S. GRANT,

Lieutenant General.

WASHINGTON, D. C., *March 29, 1866.*

GENERAL: A committee, appointed by a meeting of citizens of the north-western Territories, to prepare a memorial to Congress in favor of a bill now before that body in aid of the Northern Pacific railroad, has instructed me to solicit your views upon the importance of that route to the United States, in a military point of view, especially in reference to the speed and cost of transportation of troops and supplies. Your experience as quartermaster for the military department of Oregon renders your opinion of great influence and weight upon the matter, especially as it has been found impossible to procure statistical details. If you can find time within the next ten days to reply to this you will confer a personal favor upon me, as well as render an important service to the people of the west. I may add, that I would be glad that your views should be stated as much in extenso and covering as wide a field as to you may seem fit, referring to the probable future wants of the country, as well as to its past and present condition.

I send you, herewith, a copy of the charter of the company, a report of the Boston Board of Trade, and the bill now urged upon Congress. The management of the road has recently passed into new hands—men possessing both financial means and engineering skill and experience. A list of the officers and directors accompanies this.

Very respectfully, &c.,

GEORGE GIBBS,

Chairman of Committee on Memorial.

Major General RUFUS INGALLS.

WASHINGTON, D. C., *April 21, 1866.*

DEAR SIR: I have to acknowledge the receipt of your letter of the 29th of March, with accompanying documents, relating to the Northern Pacific railroad, which I have read with much satisfaction, and my long residence on the Pacific coast, as quartermaster of the department of Oregon, has enabled me to become well acquainted with the country, and leads me to take especial interest in the success of the enterprise.

No country offers greater inducements for emigration and settlement than that traversed by the line of the Northern Pacific railroad, and, without a railroad, none more inaccessible. The rich and extensive gold fields of the northwest will create such demands for labor and transportation that high rates for the same must, of necessity, be maintained for years to come, unless the building of a railroad shall contribute to reduce them. Some idea of the magnitude of the traffic carried on over the great plains may be found from the following statistics: The aggregate shipments of twenty-seven firms and industrial freighters from Atchison, during the year 1865, amounted to 21,531,830 pounds of assorted merchandise, requiring for its transportation 4,917 wagons, 7,154 mules, and 27,675 oxen, and employing 5,256 men. The total amount of capital invested in wagons, mules, oxen, horses, &c., employed in the trade, is over six millions of dollars. The overland coaches which leave Atchison daily took out during the year 2,007 passengers, and brought in 2,231; they also brought in \$24,000,000 in specie, and carried out 46,000 pounds of express goods. It is estimated that the freighting trade was seven times greater than that of 1861, and five times larger than in 1862, four times larger than in 1863, and exceeds the trade of 1864 by 4,893,440 pounds, and it is the opinion of the most experienced freighters that the business of the present year will be double that of the past year. I am informed that the Territory of Idaho contains a population of 40,000 inhabitants, and that the Territory of Montana, which a year ago contained a population of some 12,000, has to-day a population estimated at 35,000, with a fair prospect of its being increased within the present year by emigration to double that number. The importance of a railroad can hardly be overestimated to this immense population, so far distant from the great centres of trade and commerce, dependent, as they now are, upon inland transportation by teams, and confined to the few months of the year when the grass is good and the weather favorable.

The establishment of military posts uniformly follows the settlement of a new country, and government, by the immediate construction of this road, would be benefited by the great reduction in the cost of sending troops to that country, and in the supplies that would necessarily be required, as also in the saving of time, which is of the utmost importance in all military operations. The recent rebellion has demonstrated the efficient aid rendered by railroads in concentrating troops and munitions of war at given points, and, as a military necessity, a long and extended line of road, like the Northern Pacific railroad, connecting the two great oceans, should receive the most favorable consideration from government, and such temporary aid by the way of a guarantee upon its stock, as proposed in the bill now before Congress, or something similar, as would enable the company to command the aid and capital necessary to secure the immediate prosecution of the work. Thus the country would become developed, and the lands of the company find a market by the increase of population, thereby enabling it to return to the government any material aid which might be rendered. Nothing would so much conduce to the settlement of the difficulties with the several Indian tribes as the facilities offered by railroads for a speedy communication through this country, much of which is yet unexplored.

In my opinion, from an experience of many years in the quartermasters' department in the west and northwest, it is of the utmost importance to the nation

that this road should be constructed at the earliest moment possible, and a through line of communication opened from the great lakes to the Pacific ocean by the head-waters of the Mississippi and Missouri.

I am yours, very respectfully,

RUFUS INGALLS,

Brevet Major General and Quartermaster U. S. A.

Hon. GEORGE GIBBS,

*Chairman of Committee on Memorial of a meeting of
citizens of the Northwest upon the Northern Pacific Railroad.*

REPORT OF EDWIN F. JOHNSON, ENGINEER-IN-CHIEF, TO THE BOARD OF DIRECTORS, NOVEMBER, 1867.

To the President and Directors of the Northern Pacific Railroad Company:

GENTLEMEN: By request of your president, I submit the following statement in relation to the enterprise under your charge.

CHARTER.

The charter of the Northern Pacific Railroad Company authorizes the construction of a railroad and telegraph line, beginning at a point on Lake Superior in the State of Minnesota or Wisconsin; thence westerly by the most eligible route within the territory of the United States, on a line north of the forty-fifth degree of north latitude, to some point on Puget sound, with a branch in the valley of the Columbia river, to a point at or near Portland, in the State of Oregon, leaving the main trunk line not more than three hundred miles from its western terminus.

The charter, as above, grants the company the right of way for their road through the public domain, together with all necessary ground for building connected therewith. It also grants to the company, its successors and assigns, alternate sections of the public land for a limited distance on each side of the line of their road, upon conditions similar to those contained in the charters of other railroad companies having similar grants. If the lands thus granted have been previously taken up under a grant to any other railroad company, the said other company may assign its interest in the said sections to the Northern Pacific Railroad Company, or may consolidate with said company upon the terms named in the charter.

Mineral lands, except such as contain iron and coal, are excluded from the grant, and in lieu thereof a like quantity of agricultural lands may be taken within a specified distance of the line of the road. The Indian title to the lands thus granted is to be extinguished by the government as early as possible.

COURSE OF THE ROAD.

It will be perceived from the above, that there are considerations which will influence the location of the Northern Pacific railroad which do not ordinarily enter into the location of a railway. Directness of alignment and lowness of gradients are important characteristics of all such works, and should be adhered to as closely as the features of the country and connections with important business points, and cost of construction and value to the company of their land grant, will permit.

An examination of the map of the country from Lake Superior westward to the Pacific ocean, herewith presented, prepared from the latest surveys and explorations of the company and others, shows that the road in its course west-

ward must, after leaving the Mississippi river, intersect the waters of the Red River of the North, which flow into Hudson's bay, and those of the James or Dakota branch of the Missouri, and passing thence west enter the upper portion of the Missouri valley, which has a direction nearly east and west, and from thence must pass across to the waters which flow into the Columbia river, reaching the sea by that valley, or, leaving it, cross the highlands west of the Columbia, to the waters of Puget sound, which are to be understood in the charter and in this report as including all of the inland tide waters connected with the strait of Juan de Fuca, south of the international boundary.

The line of the railroad, on leaving Lake Superior, will very properly be deflected somewhat to the south of a direct course, until it reaches the point of crossing the Mississippi and Red rivers, because the features of the country favor such a location, the length of the road not being thereby very much increased, or the amount of land embraced in the grant materially lessened.

The summit ground between the Mississippi river and Lake Superior in this direction is proved by actual surveys, made under the direction of General Ira Spaulding, chief engineer of the Minnesota division of the railroad, to be only 1,158 feet above the ocean level, or 558 feet above Lake Superior. This elevation is attained very gradually from the lake, in a distance of thirty-one miles from Superior harbor, at the extreme western end of the lake.* The elevation of the Mississippi at the place of crossing a little above Crow Wing is 1,152 feet. The line to this crossing, after leaving the main divide, passes two summits which separate branches of the Mississippi; the first between Kettle and Rice rivers, 1,326 feet, and the second between the Mille Lacs and the Mississippi, 1,332 feet. These measurements indicate that at some future day the waters of the upper Mississippi may be easily and advantageously connected by canal with Lake Superior.

From the mouth of the Crow Wing river a direct line, drawn to Seattle, in Washington Territory, one of the principal places named in the reports of the government explorations as a suitable terminus for the railroad on the Pacific, passes a little to the south of the mouth of the Yellowstone, near to Fort Benton, and the Grand Falls of the Missouri; thence near the Flathead and Pend d'Orielle or Kalispelm lakes, crossing the Columbia river at the outlet of Lake Chelan. The length of this line, by computation from the latitude and longitude of its termini, is 1,318 miles, and being an arc of a great circle of the earth, is properly represented by a curve line as represented upon the map. A similar line drawn from the western extremity of Lake Superior to Seattle has a similar curvature, with a location a little more to the north, and a length of 1,418 miles.

The direct course from Crow Wing to the other terminus on the Pacific at Portland, in Oregon, crosses the Missouri near the mouth of the Heart river, and the Yellowstone near the mouth of Powder river; thence it continues along upon the north side of the Yellowstone to near the Little Blackfoot passes in the main range of mountains; thence its course is near to the former site of St. Mary's Mission, near Fort Owens, and across to the Columbia near Wallula, keeping near to the Columbia river for the remainder of the distance to Portland. The length of this line from Crow Wing is 1,367 miles; that of a direct line from Superior, 1,466 miles.

It follows from the above that the line of the railroad, to reach the termini as provided in the charter, should, to be the shortest possible, (Seattle being assumed as a proper terminus,) occupy ground intermediate between the two lines thus described. This would indeed follow if there were no causes in the conformation of the country or otherwise for giving it a different position.

*Another line has been surveyed by General Spaulding, from Bayfield and Chegwamigon bay, via St. Cloud, meeting the line by Crow Wing west of the Red river; but as full returns have not been received of that and of other surveys, they will be reserved for a supplemental report.

TOPOGRAPHICAL VIEW.

From Lake Superior all the way to the main divide of the waters of the Missouri and Columbia, a distance of over one thousand miles, there is no mountain range to be overcome or encountered in following nearly the direction of the above described lines. Within this distance, however, and situated not far from the main divide of the waters, are several short detached ranges or outliers of the main range of mountains, which are easily avoided in locating the line of the road. These are the Little Rocky and Bear's Paw mountains on the north side of the Missouri, and the Judith and Belt or Girdle mountains on the south side of that river, the latter including the ridge through which flows the Missouri in a deep cañon about six miles in extent, called by Lewis and Clark the "gate of the mountains."

The entire country between the Alleghany and the Rocky mountains, and extending from the Gulf of Mexico north to where the waters flow into Hudson's bay, is mainly one vast plain, its surface not very greatly varied, and most depressed where flow the waters of the Mississippi and its main branches, and only sufficiently elevated at its northern limit to determine the flow of the waters in the two opposite directions of north and south.

Most of this surface north of the latitude of forty-five degrees, which is the southern limit to the location of the Northern Pacific railroad, (the northern limit being the latitude of forty-nine degrees,) is mostly prairie, level and rolling. The divide in question takes the name of the *Hauteur des terres* in Minnesota, and the *Coteau des prairies* and the *plateau du Coteau du Missouri* in Dakota and further west. North of this long plateau or divide, which is sprinkled over with innumerable lakes and ponds, giving to it a lacustrine character of great beauty, and adding to its great fertility, is an immense plain or basin, similar in character to that drained by the Mississippi, mostly prairie, stretching to the base of the Rocky mountains on the west, the drainage of which is conveyed by the Red and Mouse and Assiniboin and Saskatchewan rivers and their branches, into Lake Winnipeg, thence by Nelson's river into Hudson's bay. These rivers, like the Mississippi and its branches, are navigable for long distances, and traverse in their course tracts of country of great fertility.

The elevation of the ground between Lake Superior and the Mississippi river, in the direction of Crow Wing, has been stated as derived from exact measurement. Westward to the Red river it is also known by similar measurement to be as shown in the profile on the map. The summit between the sources of the Crow Wing or Leaf river and those of the Ottertail is 1,419 feet, and the Red river, near the mouth of the latter, is 935 feet.

In Washington Territory, the surveys made the present season, under the direction of General James Tilton, chief engineer of that division, show by actual measurement that there are at least three very practicable passes in the Cascade range of highlands, viz: Packwood's, or the Cowlitz, the true Snoqualmie, and Cady's, situated as represented on the map. The first is south of Mount Ranier, leading from the Nisqually and Cowlitz rivers to the Tanum branch of the Na-chess river. The second is north of Mount Ranier and of the pass reported upon by Governor Stevens, and leads from the Snoqualmie to Lake Kitchelus, a tributary of the Yakima; and the third is still further north, between the waters of the Pisuouse or We-nach-ee and the Sky-ko-mish.

The second, or Snoqualmie, is the one selected for the crossing of the line, on which an estimate of cost and statement of distances and gradients will be made. The measurements show that a road through this pass will not exceed in elevation 3,000 feet above the sea. The eastern base of this range is washed by the waters of the Columbia, which flow at an elevation of 400 to 800 feet above the sea, and form the western boundary of the Columbia plain. The

ascent to the pass on the east side will therefore not exceed 2,600 feet, and will be as easily accomplished as the pass of the Alleghanies in Pennsylvania.

From the Red river westward to the Columbia valley the elevation of the country is known mainly by barometrical measurements, but, as the latter have at the more important points been repeated and verified by different observers, they exhibit with sufficient accuracy the leading features of the country, and are reliable as a guide to the practicable routes for the proposed road, and the average and probably ruling gradients of those routes.

DESCRIPTION OF THE LINE OF THE ROAD.

Of the several routes or lines available for the proposed railroad, the one represented by the continuous black line upon the map is the one upon which an approximate estimate of cost will at this time be submitted. The elevation of the ground upon this line at prominent points is shown by the profile affixed to the map, which exhibits in figures the inclination in feet per mile of the several lines connecting those points.

The line thus selected for an estimate of cost crosses, after leaving the Mississippi, the Red River of the North, connecting with the navigation upon it; thence it continues to the Dakota or James river, which it intersects in latitude $46\frac{1}{2}^{\circ}$ nearly; thence the line continues to the Missouri and Yellowstone rivers, crossing the former in the vicinity of the site of old Fort Clark and the latter in the latitude of $47\frac{1}{6}^{\circ}$ north nearly, both of which rivers are navigable for steamers for long distances above and below the points of crossing; thence along and north of and not far from the Yellowstone, keeping to the south of the divide which separates its tributaries from those of the Missouri, to near the mouth of the Big Horn river, and from thence to near the southern extremity of the Judith mountains, bearing thence northwesterly between the latter and the Belt or Girdle mountains, passing near to the Grand Falls of the Missouri, the limit of steam navigation upon the latter for the larger class of river vessels; crossing the Missouri above the falls; thence by Cadot's Pass, in the main range of the Rocky mountains, following the valley of the Cokalabishkit or Big Blackfoot river, diverging therefrom by Lansdale's trail, represented as practicable, through an opening to the valley of the Jocko river; thence down the Clark's River valley to the Pend d'Oreille lake; thence southwesterly to the Spokane river and along the southeasterly side of the great Columbia plain to the crossing of the Columbia river, not far from the mouth of the Yakima river; thence along the valley of the latter river to its source at the true Snoqualmie Pass of the Cascade range of highlands as above described, northwest of Lake Kitchelus, and from thence to Seattle, on the shore of Puget sound.

The branch line to Portland, in Oregon, leaves the main line near the crossing of the Columbia river, on the west side, and passes down the valley of that river, as represented, to its terminus at Portland, on the Willamette river, a short distance from the Columbia river.

CHARACTER OF THE LINES.

Upon the line or route as above described, from Lake Superior to the Dakota or James river, there is no very marked irregularity of surface except for a limited distance next westward of the summit separating the waters of the lake from those of the Mississippi, and at the divide between the Leaf and the Ottertail rivers, where is a belt of irregular ground, a portion of the *hauteur des terres* known as the "Leaf Hills," the result of a drift deposit which extends around southerly and westerly between the sources of the Ottertail and the branches of the Mississippi. This belt, after reaching the sources of the Pomme de Terre or Tapsina river, curves to the north and crosses the Ottertail a few miles west of the Ottertail lake, where it is again passed by the line of the road.

With these exceptions the ground from Lake Superior to the Red river is only varied by ridges of moderate elevation and corresponding depressions, while from the Red river to the Dakota or James river it is one vast prairie plain, with very little to break the uniformity of its appearance for the entire distance.

The line as described passes to the north of the *Coteau des prairies*, which is elevated nearly two thousand feet above the sea level, being the highest land in that region, and to the south of the Shayenne branch of the Red river, which runs for a long distance in a deep and rather narrow valley, about one hundred and fifty feet below the general level or surface of the country. The line in this distance crosses the Wild Rice branch of the Red river, which is not much depressed below the general surface. The maximum gradient on this portion will not exceed thirty-five to forty feet per mile.

Between the Dakota river and the Missouri and near the former is the *plateau du Coteau du Missouri*, the plateau rising, in the judgment of those who have seen it, from six hundred to nine hundred feet above the crossing of the Dakota. The latter is the elevation assumed in the profile. The surface of this plateau is heavy rolling, and maintains this character, but in a moderate degree, most of the way to the Missouri. Forty feet per mile is the estimated maximum gradient on this portion. The Missouri river at the proposed place of crossing is bordered by low grounds, which are wooded, and extend some distance from the river.

From the Missouri river to the Yellowstone the surface is of the same general character as just described, viz: high rolling prairie. This is the description given of it by Dr. Evans, who examined it and expressed the opinion that very fair ground for a railway would be found between the two rivers as far south as the latitude of 47° . The principal streams which drain this space flow as they approach the Missouri in rather deep valleys.

Those which are tributary to the Missouri have a direction favorable to the line of the road. The place of greatest difficulty is the crossing of the Little Missouri, which has a northerly course at variance with the direction of the road; and flows in a valley considerably depressed below the general surface of the country. These circumstances will explain the deflection or curvature of the line to the north between the Missouri and the Yellowstone as represented upon the map. Neither upon this portion of the road nor upon the portion east to the Dakota river, will it be necessary, it is believed, to exceed forty feet per mile for the maximum gradient of the road.

At the crossing of the Yellowstone the low grounds extend for some distance to the northwest, and the valley is broad and rich. Thence to the Missouri river, near the head of the Grand Falls, the road in its gradients will undulate, conforming to the changes in elevation produced by the several depressions in which flow the tributaries of the two principal rivers named.

Upon this portion, embracing an estimated distance of three hundred and fifty miles, the gradients, judging from the general level character of the surface as described, will not probably exceed thirty feet per mile. The line is placed near to the Yellowstone as far up as the Big Horn branch because of the advantage to be derived from its navigation in the construction and operation of the road. Of the character of this navigation mention will be made further on.

From the last or second crossing of the Missouri, near the Grand Falls, the line passes the plateau which separates the Dearborn from the Sun or Medicine river, and after leaving the former ascends to Cadot's Pass, in the main range of the Rocky mountains, which for several hundred miles in Montana lose their formidable character as a mountain range, and afford numerous passes which do not exceed fifteen hundred to two thousand feet above the general level of the country at their eastern base.

The Pass of Cadot's, by the most reliable measurements by I. W. Howard, assistant to Captain Mullen, is 6,167 feet above the sea. This is upon the sup-

position that the junction of the Big Blackfoot or Cokalashishkit with the Hellgate river is 3,324 feet above the same level, which is its elevation as given in the last report of Governor Stevens.

The construction of a tunnel $2\frac{1}{2}$ miles in length will lessen the elevation of the pass 830 feet, giving for the highest elevation of the railway above the sea, 5,337 feet,* and above Fort Benton, the present head of steam navigation on the Missouri, distant only ninety miles, 2,500 feet.

In approaching this pass upon the east side a gradient of seventy feet per mile for a limited distance is supposed to be necessary to reach the tunnel, attended with some heavy work.

The line in its course west from Cadot's Pass descends along the valley of the Blackfoot to a point about midway between the pass and the Hellgate defile, from whence it leaves that valley, keeping to the right or north along what is represented to be feasible ground to the Jocko river, and by the latter river to the Flathead river.

The gradients for this distance will not exceed fifty feet per mile, probably, unless for a very short distance in the vicinity of the main summit they may rise to 70 or 75 feet per mile.

The Flathead and Clark's River valleys are narrow comparatively, and mountain-bound. The two valleys have an average descent of about three feet per mile. The rivers have a descent less than that following the sinuosities of their course. Thirty, or at most forty feet per mile it is supposed will be the maximum gradient upon this portion. Upon these rivers is a natural navigation for steamers for a long distance, which will be described further on. The line follows the Clark's valley no further than the Pend d'Oreille lake. From the latter point to the crossing of the Columbia river it passes several summits of moderate elevation and the corresponding depressions. The maximum gradient, it is estimated, will not exceed forty feet per mile.

The lower portion of Clark's river, below the mission of St. Ignatius, is obstructed by falls, and there are falls upon the Columbia at Colville, and rapids below, and the course of these rivers, if they flowed in valleys favorable to the construction of a railroad, which they do not, is not such from the Pend d'Oreille lake, as can be followed by the line of the road until the mouth of the Yakima is reached. To this latter point and above to White Bluffs the steamers of the Oregon Navigation Company from Portland are now running. Coaches in connection with these steamers, also, now run regularly via Walla-Walla across the Columbia plain to the southern extremity of Pend d'Oreille lake, where they connect with the steamers on Clark's river, thus forming an easy and expeditious line of travel from the Pacific ocean to the mountains.

From the Columbia crossing, up the valley of the Yakima for one hundred miles nearly, the gradients are low, averaging twelve feet per mile, and not exceeding probably twenty-five feet per mile, and the very heavy work is limited in extent.

For the remaining fifty miles to the summit or Snoqualmie pass the average inclination is 28 feet per mile, and maximum probably about fifty feet per mile. Upon the west side of the summit the descent is rapid on a direct course, but by making it obliquely along the face of the range, it can be effected, as appears from such measurements as have been made, at the rate of 80 or at most 90 feet per mile for the maximum. The pass is a valley heavily timbered, situated a few miles to the northwest of Lake Kitchelus, into which flows a small stream having its source near the summit in the pass.

The line down the Columbia river to the Portland terminus is reported as very feasible. Only in two or three places does it encounter difficult rocky spurs. Full returns from the surveys of this portion have not yet been received. Forty feet per mile is the maximum gradient upon it.

* The highest elevation attained on other portions of the route does not exceed 3,000 feet.

The preceding is a description simply of the line of the Northern Pacific railroad as represented on the map, and as assumed in the estimate of cost which is to follow. Changes in the route can no doubt be advantageously made at particular points, and some of these will be noticed in another place.

CONSTRUCTION.

The supply of materials for the construction of the road, a question of the greatest importance upon all the proposed routes to the Pacific, is more easily and satisfactorily answered upon this route than upon any other.

In the estimate of cost the iron used in construction will be assumed as furnished from the Atlantic States, notwithstanding the abundance of ore and fuel in the region of the mountains and other places justifies the belief that for a considerable portion of the road and its outfit, that metal may be obtained at a cheaper rate from localities near to the line of the road.

Rock suitable for construction is found convenient of access on a very considerable portion of the line. Where not thus found, and required for masonry, it must be procured from localities more remote, and the road as completed used for its transportation.

Timber is found in abundance and convenient from Lake Superior to the Red river, the western boundary of Minnesota. The varieties available are white and yellow pine, tamarac and oak. From the Red river to the Missouri it is found only upon the margins of streams and ponds, and will be obtained probably most cheaply from the vicinity of the road in Minnesota or from the valley of the Missouri, using the railway as constructed for its conveyance.

The timber from the Missouri is mainly cottonwood, with elm and ash, and needs a proper treatment before being used in construction.

From the Missouri to the Yellowstone, timber of a character similar to the above will be obtained, not only from those rivers but from the streams intersected by the road, particularly the upper portion of the Little Missouri, which is called by the natives "the thick-timbered river."

From the crossing of the Yellowstone to the base of the mountains, the cottonwood is abundant near the streams, and pine, fir, and cedar are found in the high grounds, and although the country is in general thinly timbered, its character in this respect is changed after leaving the Yellowstone valley, and it will furnish very much more than the road will require for bridges for the track and for buildings of all descriptions. From the eastern base of the mountains, or the last crossing of the Missouri, to the two termini on the Pacific, timber is abundant and accessible, with the exception of a portion of the Columbia plain from the Paluse to the crossing near the mouth of the Yakima. The timber thus obtainable is yellow pine, larch, fir, cedar, and near the lower Columbia and in the valley of the Yakima, oak.

The streams which require to be bridged have a character favorable for the purpose, involving no very extraordinary expense in construction or maintenance. Except upon the western slope of the Cascade mountains, and from Lake Superior to the Red river, they are not liable to be suddenly swollen to an unusual height, and upon the last-named division the floods are moderate compared with the rivers which rise in the Alleghanies, and the more eastern mountains.

Even under the unprecedentedly heavy fall of rain which occurred in a portion of Minnesota the present season the streams were not more swollen than is annually the case with the eastern Atlantic rivers, because of the flatness of the surface and the numerous lakes and ponds which receive and hold back the flood waters.

The Red river, when flooded, has a rise of about 20 feet, attended with a moderate current. This is owing to the small descent of its valley and to its northerly course, the ice being firmer in its lower portion, and, breaking up later,

forms, for the time being, an obstruction which causes the water to accumulate in the upper part of its valley.

The upper Mississippi and the Yellowstone rise from five to ten feet, and their branches ten to fifteen feet, in the spring. The mountain streams rise eight to ten feet, Clark's and Flathead river fifteen feet, and the Columbia fifteen to twenty feet. In midsummer a second rise occurs in the streams west of the *Coteau du Missouri* of a less marked character, produced by the melting of the snows on the more elevated ranges. This latter rise favors greatly the navigation of the rivers, and at both seasons the rise is in most cases gradual, and the subsidence takes place in the same gradual manner.

Upon the line as described, water for the use of men and animals and for the motive power of the road can, it is believed, be obtained in ample quantity at suitable distances, if not from running streams and springs, from wells of no very great depth or through aqueducts of not an unreasonable length.

With the exception of the crossing of the *Coteau du Missouri* and the narrow belts of the *Maunaises terres*, between the Missouri river and the mountains, and a small portion of the Columbia plain, no serious difficulty in this respect is anticipated.

The expedition which left Minnesota for Montana the present season have reported that they experienced on their journey very little inconvenience from the want of water, notwithstanding their march was not a rapid one, and the season unusually dry.

The line of the railroad, as proposed, being intersected and approached at very many points throughout its entire extent by navigable waters, and the agricultural capabilities of the country through which it passes are so good for most of the distance, its construction can, it is believed, be accomplished in comparatively less time, and without the payment of such exorbitant prices for supplies for men and animals and for transportation as must necessarily be paid upon other routes, destitute of like advantages.

The direct distance from the western extremity of Lake Superior to Seattle, in Washington Territory, has already been stated at 1,427 miles, and to Portland, in Oregon, 1,467 miles, as obtained by computation. By the line of the road as described and shown on the map, the former is estimated at 1,775 miles, and the latter at 1,755 miles, or an increase of 25 per cent. in one case and 20 per cent. in the other, or one mile allowance, nearly, for deviation from a direct course for every four and five miles of the distance in the two cases respectively, on the portion of the line not surveyed, which is believed to be a liberal allowance.

ESTIMATE OF COST.

An estimate of the probable cost of building the road upon the line as proposed will now be submitted.

In this estimate the customary width of road-bed is assumed, and the usual side slopes, with proper provision for drainage. The bridges, unless otherwise specified, are supposed to be built substantially of timber, and the culverts and bridge supports to be constructed mainly of stone. The item of clearing and grubbing in the timbered portions is included in that of grading. Fencing is omitted, as material for it will be more cheaply obtained after the road is built and in operation, and will only be required as the lands are sold and improved. The weight of the iron rail assumed in the estimate is sixty pounds per lineal yard, or 106 tons of 2,000 pounds each per mile, and chairs, &c., in proportion.

ESTIMATE OF COST, SINGLE TRACK.

FIRST DIVISION.

Lake Superior to near the south point of the Judith mountains, Long. 109° W.

Distance, 895 miles.

Clearing, grubbing, grading, masonry, bridging, and ballasting, road bed complete for single track, \$18,200.....	\$16,289,000
Railway single track complete, \$16,400.....	14,678,000
Docking and extra grading at lake terminus.....	800,000
Extra grading, docking, and bridges at the crossings of the Mississippi river, the Red river, the Missouri and Yellowstone rivers, and bridge over the Little Missouri.....	993,000
	<hr/>
	32,760,000
Add for double track and sidings one-seventh.....	4,680,000
Engineering and contingencies.....	4,071,000
Telegraph, transporting materials long distances.....	2,685,000
	<hr/>
Total.....	44,196,000

SECOND OR MOUNTAIN DIVISION.

South point of Judith mountains to the Columbia river. Long. 119° W.

Distance 660 miles.

Clearing, grading, masonry, bridging, and ballasting, as above, \$41,500.....	\$27,390,000
Railway single track complete, \$19,100.....	12,606,000
Tunnel at Cadot's Pass 2½ miles and bridge over Missouri river.....	3,157,000
Bridges over Flatheads, Clark's, and Columbia rivers, and extra grading and docking.....	800,000
Branch connection with the Missouri river near Fort Benton, 25 miles.....	952,000
	<hr/>
	44,905,000
Add for double track and sidings one-seventh.....	6,415,000
Engineering and contingencies.....	3,500,000
Telegraph, transporting materials long distances.....	2,055,000
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Total.....	56,875,000

THIRD OR CASCADE DIVISION.

Crossing of the Columbia river at Seattle, on Puget sound.

Distance 220 miles.

Clearing, grading, masonry, bridging, and ballasting, as above, \$35,000....	\$7,700,000
Railway single track complete, \$18,200.....	4,004,000
Extra grading and docking at terminus.....	504,000
	<hr/>
	12,208,000
Add for double track and sidings one-seventh.....	1,744,000
Engineering and contingencies.....	1,000,000
Telegraph.....	660,000
	<hr/>
Total.....	15,612,000

FOURTH DIVISION, OREGON BRANCH.

Distance 200 miles.

Clearing, grading, masonry, bridging, and ballasting, as above, \$32,000....	\$6,600,000
Railway single track complete, \$17,500.....	3,500,000
Extra grading and docking at terminus and railroad ferry, Columbia river...	715,000
	<hr/>
	10,815,000

NORTHERN PACIFIC RAILROAD.

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Add for double track and sidings one-seventh	\$1,545,000
Engineering and contingencies	850,000
Telegraph, transporting material long distances	600,000
Total	13,810,000

To the preceding must be added the cost of equipment and of the necessary buildings and machinery for operating the road, estimated as follows:

580 locomotive engines, \$17,000 each	\$9,860,000
148 passenger cars, \$5,300 each	784,400
38 smokers' cars, \$4,300 each	163,400
60 baggage, mail, and express cars, \$3,000 each	180,000
7, 190 box, freight, cattle and platform cars, \$1,330 each	9,562,700
127 caboose and wrecking cars, \$1,550 each	193,850
62 tool cars, \$1,000 each	62,000
1,600 gravel cars, \$500 each	800,000
114 grampus and hand cars, \$250 each	28,500
Snow ploughs, &c., &c	762,150
Total rolling stock	22,400,000
Cost per mile of road	\$11,200

Dormitory or sleeping cars are usually furnished by contractors, who pay the railway companies a stipulated price for traction and the use of the road. Travellers pay extra for their use. Upon the road in question, if these are provided by the railroad company, as they should be, the sum total for rolling stock will be increased.

BUILDINGS, &C.

166 wood and water stations, \$5,000 each	\$830,000
16 engine houses and turn tables, \$20,000 each	320,000
14 engine houses and turn tables, \$10,000 each	140,000
5 principal engine repair shops, \$160,000 each	800,000
2 principal car repair shops, \$80,000 each	160,000
2 principal car repair shops, \$55,000 each	110,000
3 principal car repair shops, \$30,000 each	90,000
170 section, tool, and hand-car houses, \$1,000 each	170,000
150 freight and passenger stations, \$3,600 each	540,000
160 freight platform stations, \$1,500 each	240,000
15 principal freight and passenger depots, \$60,000 each	900,000
Total	4,300,000
Cost per mile of road	\$2,150

SUMMARY OF DIVISIONS.

First division, road-bed and track, as above	\$44,196,000	
Equipment, \$11,200 per mile, as above	10,024,000	
Depot buildings, \$2,150 per mile, as above	1,922,500	\$56,142,500
Second division, road-bed and track, as above	56,875,000	
Equipment and depot buildings, as above	8,811,000	65,686,000
Third division, road-bed and track	15,612,000	
Equipment and depot buildings, as above	2,937,000	18,549,000
Total main line		140,377,500
Oregon branch, road-bed and track	13,810,000	
Equipment and depot buildings, as above	2,670,000	16,480,000
Total main line and branch		156,857,500

It is assumed in the above estimate that the business of the road will require three passenger and five freight trains each way daily, or trains equivalent thereto. A passenger train is supposed to consist of three first class cars, one second class car, one baggage car, and one express or mail car. The speed of passenger trains to average, including stoppages, twenty-five to thirty miles per hour. The freight trains to consist each of fifteen to thirty freight cars, moved at the average speed of twelve miles per hour.

Thirty miles per hour for passenger trains is attained upon very many roads having a much less favorable alignment than the Northern Pacific railroad will have when built. The superiority of the latter in this respect will warrant the assumption of a higher speed under a moderate increase in the cost of traction, if the road is properly constructed and equipped with reference to such speed. It is not unreasonable to assume that forty miles per hour is attainable without very extraordinary wear and tear, and such a speed for at least one daily train, during the milder portion of the year, will add greatly to the value of the road to the public.

Collecting the above items, and the entire cost of construction and equipment of the road and of the telegraph ready for use is as follows:

RECAPITULATION.

	Distance, miles.	Estimated cost.	Average cost a mile.
First division	895	\$56, 142, 500	\$62, 730
Second division.....	660	65, 686, 000	99, 524
Third division.....	220	18, 549, 000	84, 313
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Total main line.....	1, 775	140, 377, 500	79, 086
Oregon branch.....	200	16, 480, 000	82, 400
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Total main line and branch...	1, 975	156, 847, 500	79, 421
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To the preceding must be added the expenses incurred outside of the engineer department, such as general expenses of management, interest upon loans, discount on bonds, &c.

These have often formed, from the delays and difficulties encountered, and inadequacy of capital, an important item in the cost to shareholders of very many roads now in operation. An addition of \$10,000 per mile would probably not be an unreasonable allowance for this item, bringing the average cost per mile of the main line and branch up to about \$90,000.

In this connection it will not be improper to state that the government credit asked for in the bill before Congress, averages less than one-third of the probable cost of the road as estimated. This is owing to the very long distance to the mountains on the northern route to which the lesser credit of \$16,000 per mile applies. It is also proper to state that the estimate of cost is based upon present prices for labor and materials, with gold at 140 to 145. In its preparation, ample allowance has been sought to be made for the extraordinary difficulties which must be encountered in the construction of the road. The item for engineering will necessarily be large, because of the necessity, with a view to securing the lands granted by the government, of an early location of the entire line. This location, to be satisfactory, involves the exploration of a wide range of country, which must be made under great disadvantages, because of the absence of any cheap means of conveyance, and of the very high prices for subsistence which rule west of the Missouri, produced by the rapid increase of the population in that region. These prices, it is fair to presume, will not obtain to the same degree during the period of the construction of the road, and especially if the portions which can be made most available for the conveyance of supplies are first built. As compared with other lines of railway to the

Pacific, the long lines of navigable waters intersected by the road or running parallel with it will have a most marked effect in lessening the cost of construction, and in furnishing business for the road when built.

It is proper, also, to remark that the estimate of cost of the portion where no actual survey has yet been made, and where the quantities have not been determined, although not fully reliable, is yet probably not so far from the truth as many may be inclined to suppose. In forming an opinion upon this subject it must be considered that the items which make up about two-thirds of the amount of the estimate, such as the rail track, ballasting, buildings, rolling stock, telegraph, &c., can be computed with a tolerable degree of accuracy; and that one item, ordinarily a large one on railroads, and one not easily predetermined, viz., the right of way, does not enter at all, or very slightly, into the estimate. It will be seen that the error, if any, is limited mainly to a portion only of the one-third part which represents nearly the cost of the road bed or gradation, so that, should this item vary by so large an amount as one-fourth from the judgment of the engineer, the effect upon the entire cost of the road and its appurtenances will be only about one-twelfth part, or eight per cent. of the whole. This, of course, supposes that those items which are susceptible of a more correct valuation are rightly estimated. While, therefore, the total estimate of cost, as above given, is only an approximation, it is sufficiently near the truth to give those seeking information a very just idea of the character, as to cost, of the different portions of the route and of the probable ultimate cost of the whole road. Upon the eastern railroads the item of clearing and grubbing is usually a large one. The saving in this item on the Northern Pacific road, so much of the country being prairie, will go far towards defraying the cost of transportation of timber for ties and for other purposes on the prairie portions.

In the construction of the railroad there will be a choice of the portions on which the work should be commenced. From Lake Superior to the Red river an early construction is important to accommodate the population now collected in the valley of the Mississippi north of St. Anthony, and to encourage settlements in the vicinity of the road, and give greater stimulus and encouragement to the tide of emigration now setting quite strongly into the region lying west of the Mississippi to the Red river. At present, access to the cheap navigation of the lakes for all this region is by the long lines of railway and river navigation leading to Chicago or Milwaukee or other ports on Lake Michigan.

From the Red river to the Dakota or James river, and thence to the Missouri, an estimated distance of 245 miles, the road, when built, will become at once, because of the navigable character of the upper Missouri and the Yellowstone rivers, the great thoroughfare for travel and trade to and from the Territories of Montana and Idaho, and also of Washington and of northern Oregon, and the eastern and northern and middle States. It will form also the main line of communication between British Columbia, the British settlements and trading posts in the western portion of the great Winnipeg valley, and Canada. The early construction of the portion through the mountain region, connecting the navigations of the Missouri and Flathead and Clark's rivers, embracing a distance of 200 miles, is important, as is also the construction of the portion embracing a like distance connecting the navigation of Clark's river at Pend d'Oreille lake with that of the lower Columbia at the proposed point of crossing that river. A railway in the two last named places of 400 miles in extent only, will afford steam conveyance, in connection with the navigations, from the Mississippi river to the Pacific for seven to eight months of the year; 245 miles of railway additional from the Missouri river to the Red river, where it would probably be met by other lines from the south, will lessen very materially the time of making the transit across the continent; and 232 miles more, or 875*

* These several amounts may be lessened fifty or sixty miles by using the navigation of the Lewis river, below the mouth of the Paluse.

miles of railway, will make steam conveyance, during the season of navigation, all the way from Lake Superior to the Pacific ocean. The four several portions of the road above named can be built and put in operation in much less time than steam communication can be effected over land from the lakes to the Pacific upon any other route, notwithstanding the progress already made upon one of those routes.

The construction of the several portions of the road is a question involving the most profitable application of the capital of the company. The portions which can be longest delayed are those evidently on which the navigation of the rivers can be used as a substitute. In expressing this opinion, the importance of an early construction of the road from the Columbia crossing to Puget sound is not lost sight of, and should not be, in view of the large population which is gathering upon those waters, and of the fact that it is the true policy of the company to use their own road and means of conveyance as far as practicable for the transportation of materials and labor and supplies required in its construction.

CHANGES OR VARIATIONS IN THE ROUTE.

It is yet far from certain that the route upon which the computation of cost is made is either the cheapest or the best. That it is eminently feasible, and that a road can be built upon it, the cost of which will not differ greatly from the estimate, the face of the country being on the whole remarkably favorable, can be said with the fullest confidence in its truth.

Changes may be made in the route which it is certain are practicable, and to secure the best location for the road, the whole ground within the limits prescribed by the charter should be very carefully examined. That the route traversed by Governor Stevens, from the Dakota river to the mountains, is eminently favorable, so far as regards the even character of its surface, and superior, perhaps, in this respect, to the line on which the estimate of cost is made, is certain.

A line can, without doubt, be carried across the *plateau du coteau du Missouri*, from the Dakota river, and continued in and along the Missouri valley, keeping north of that river. Such a line will avoid the crossings of the Missouri and of the Yellowstone rivers, and will connect with the route of Governor Stevens, near Fort Union.

Another route should be examined diverging from the line on which the estimate of cost is made, after the first crossing of the Missouri, leading thence to Fort Union, and from there to the Milk river, occupying, after recrossing the Missouri, middle ground between those rivers.

From Fort Benton, or the Grand Falls of the Missouri, westward, further examinations are needed, to make certain as to the best mode of passing the mountains. A careful comparison of the reports of Governor Stevens and his assistants, with the narrative of Captain Lewis, leads to the conclusion that the pass traversed by the latter was not found by the former; or if otherwise, that there is still another practicable pass leading from one of the sources of the Sun or Medicine river, to the valley of the Blackfoot.

It is now certain that the backbone of the main range of mountains which separates the drainage of the continent is broken down to an extent of more than three hundred miles where the sources of the Missouri and branches of the Columbia interlock, and that within this distance not less than a dozen passes exist between the latitude of 45° and 49° north, all of which are practicable, and which evidently do not differ very much in their altitude above the sea level, their difference consisting mainly in the character of their approaches, the more southerly ones, or those leading into the Little Blackfoot, and thence to the sources of the Salmon river, having the advantage in this latter respect.

In view of this fact, it will be proper to make an examination of a line diverging from the line on which the estimate of cost is made, near the south point of

the Judith mountains, and following up what Captain Mullan, in 1853, supposed to be the Muscleshell, and which is either that stream or a north branch of the Yellowstone, thence to the Missouri, crossing the latter above the "Gate of the mountains," and thence by one of the Hellgate or Little Blackfoot passes, to the valley of Clark's river.

It will be necessary, also, to examine a line following up the Yellowstone, thence across to the Three or Grand Forks of the Missouri, (where is now Gallatin City,) by the Shield's River Pass, or the pass of Captain Clark, and following up the Jefferson river, seek a passage into the valley of Clark's river by the Panther or Boulder creek or Wisdom river branches, or into the valley of Salmon river, by the pass in the main range of mountains first traversed by Lewis and Clark, and which is, properly speaking, the Lewis and Clark's Pass.

An examination should also be made from near the Grand Falls of the Missouri, following up that river, particularly on its southeasterly side, in the vicinity of Graham's road, crossing it above the "Gate of the mountains," and thence to one of the Little Blackfoot passes, south of Cadot's.

These last named lines possess very great importance, running, as they do, through a region which abounds in fertile valleys, and which has been found to be rich in gold and other minerals, and within which there is now rapidly gathering a large population—a region where towns and cities are springing up as if by magic. So rapid has been its settlement that, although six years have scarcely elapsed since the cabin of the first white settler was erected within its limits, Helena City is said to contain 8,000 inhabitants, Virginia City 5,000, and several other places from 1,500 to 3,000.

Between the Clark's River valley and the Columbia, a more thorough knowledge of the passes in the intervening range is required to avoid, if possible, the great detour to the north by the Pend d'Oreille lake. The valleys of the Lou-Lou fork, or Traveller's Rest creek, and of the Fishery creek, should be explored to find, if possible, some feasible passage or opening directly into the valley of the Clearwater or the Paluse, or other tributary to the Lewis branch of the Columbia. The valley of the Salmon or north fork of Lewis river, which almost as completely divides the Bitter root range of mountains as the Columbia does the Cascade range, should be carefully explored. Lewis and Clark were deterred from descending it by obstacles which may not be formidable for a railroad. That its descent is very uniform and unobstructed by any heavy falls, is fully proved by the fact that the salmon were taken in great numbers at the western extremity of the portage which connects it with the Jefferson river.

This last named route, if found feasible, is very direct in its general course, from the Pass of Lewis and Clark to the sea, and, with a few exceptions, must be level or descending the whole distance.

From the crossing of the Columbia, the course to Portland is plain, keeping near to the river on its north side, but the location of the main line, the course of which carries it across the Cascade range of highlands, west of the Columbia, has made it necessary to explore carefully the several practicable passes in that range leading to the waters of Puget sound.

The result as to the pass known as the true Snoqualmie, the one assumed for the position of the line in the estimate of cost, has been stated. Packwood, or the Cowlitz Pass, south of Mt. Ranier, does not differ much in altitude from the Snoqualmie. Cady's Pass is a little more elevated than either. North of it is a pass leading from the We-nach-ee to the Saak branch of the Skagit, and another from the Skagit to Lake Chelan, both of which are supposed to be more elevated than Cady's. The importance of the We-nach-ee passes depends very much upon the character of the ground from the We-nach-ee eastward across the Columbia plain. This ground, from such cursory examination as it has been possible to make of it, appears feasible, and if found so, the great saving in distance on the main line will justify the passage of a much higher summit between the Columbia and the sound, and an increase in the cost.

OBSTRUCTIONS FROM SNOWS.

Neither in the construction of the road, nor in the working of it when completed, will there be any obstacles to be overcome in respect to climate or snows, not met with in the northern or middle States. Two conditions are requisite in the production of snow, moisture in the atmosphere, and a degree of cold sufficient to cause it to assume the snow form. The very common idea that the snows increase with the latitude, is not sustained by the facts. The condensation of vapor, and its precipitation in the form of rain or snow, is effected, in a right electrical condition of the atmosphere, by a degree of cold which is not excessive. The air gets its moisture mainly in the mild regions where the evaporation is greatest, and carries that moisture just so far as the temperature and other conditions will permit, and no further. This limit depends upon the latitude and the season, and the elevation of the surface. If a moving column of air, charged with vapor, is forced upwards in its course by the intervention of a range of mountains, the effect is similar to the change to a more northern latitude. The temperature of the atmosphere decreases as the distance from the earth's surface increases, until, at a certain elevation, depending upon the latitude and isothermal lines, it reaches the limit of perpetual congelation. This limit, at Frémont's Peak, latitude 43° north, has an elevation of 10,000 feet, and this is probably not far from the limit in western Montana, and the Cascade range in Washington Territory.

The mean elevation above the sea of the country along the line of the Northern Pacific road from Lake Superior to Portland, in Oregon, is 2,000 feet, very nearly, and 2,200 feet to Seattle, and the highest elevation is 5,330 feet at Cadot's Pass, and 3,000 at the Snoqualmie Pass. These elevations being situated within the mild region of the Pacific, do not, it is believed, approach so near the limit of perpetual congelation upward as does the more elevated portion of the country further south, between the valley of the Platte and the Great Salt Lake, the elevation of which is indicated by that of the three principal passes within its limits, soon to be traversed by the Union Pacific railroad, viz., Evans's Pass, 8,242 feet, Rattlesnake Pass, 7,560 feet, and Bridger's Pass, 7,534 feet. Even the pass of the Sierra Nevada, in the same line of road continued westward, is 4,000 feet higher than the Snoqualmie Pass in the corresponding range in Washington Territory.

These facts explain the character of the northern route in its comparative freedom from deep snows. In Minnesota the mean depth of snow in winter seldom exceeds two feet in the middle and western portions of the State. Near Lake Superior the depth is greater. West of Minnesota, all the way to the mountains, the snows are light, seldom exceeding a foot or fifteen inches in depth. At Fort Benton the depth does not often exceed six inches. In the mountain region, from Fort Benton to Clark's river, the snows are light. In midwinter only about one foot in depth of snow, extending a distance of from seven to eight miles, was found at Cadot's Pass, and the parties making the passage had no difficulty in subsisting their horses upon the dry grass, which was accessible and abundant along the route. This is the case with all the passes in that region. The cold in them is not severe. In the lower portion of Clark's river valley, the snow, by measurement, in the wooded portion, had a depth of two and a half feet, when in the open ground it was but a portion of that amount. In the Yakima Pass of the Cascades, Mr. Tinkham found its depth, in January, to average about six feet for a distance of seven miles. On the western slope of the Cascades, as in Clark's valley, the contrast is great between the timbered portions and the open country. Upon no portion of the northern route are the storms so severe and the fall of snow so great as to obstruct the working of the road. They will present no greater obstacle to the movement of railway trains

than is experienced upon many roads in New England and New York where trains move uninterruptedly the entire year.

The above facts indicate a comparatively small precipitation from the clouds for the entire distance from Lake Superior to the Pacific. In Minnesota the annual fall of rain and snow is equivalent to twenty-four to twenty-eight inches in depth of water; in Dakota and the valley of the upper Missouri, sixteen to twenty inches; in the mountains, about twenty-three inches; the Columbia valley, eighteen to twenty inches; and western slope of the Cascade range, about fifty inches. These latter mountains, it is evident, intercept a large portion of the moisture from the Pacific, leaving, however, a large amount, as will be seen further on, to meet the requirements of vegetation in the valley of the Columbia and in the mountain region to the west of it, as far as the valley of the upper Missouri.

NAVIGATIONS CONNECTED WITH THE PROPOSED ROAD.

The construction of the Sault St. Marie canal, at the outlet of Lake Superior, has rendered that lake accessible by vessels of all sizes from the lower lakes; and the Portage canal across the Keweenaw promontory, now under contract, and certain to be built, will facilitate greatly the passage through the lake of vessels having occasion to touch at ports on its southern border. This lake, notwithstanding its northern position, has a navigable season of seven months, which is the length of that season on the New York canals, very nearly. Observations made for several successive years at the harbor of Superior, in Wisconsin, give April 25 as the mean time of the opening of that harbor in the spring, and November 25 as the mean for closing in the fall. Access to this harbor is sometimes obstructed to a later date in the spring, by an ice-floe caused by the northeast wind, but the improvements commenced by the government may remedy to a certain extent that difficulty. The harbor is an excellent one for vessels of a medium draught, but will require deepening to adapt it to the depth of water (12 feet) in the canals.

At Duluth, on the south shore of the lake, eight miles from Superior, should a harbor be formed as proposed by the construction of a jetty or lake wall, it will have a good depth of water, and be less obstructed by the ice-floe referred to than Superior harbor.

Bayfield, the best port in that part of the lake, has an excellent natural harbor, and ample depth of water. It is situated some fifty or sixty miles east of the bay of Superior, in a strait two and a half to three miles wide; wide enough to render some protection necessary to enable vessels to lie quietly at the docks. The same remark will apply to a harbor further south in Chagwomigon bay.

The navigation of Lake Superior, owing probably to its greater depth and elevation above the sea, and more northerly position, is, if any difference, less difficult than upon the lower lakes, and with equal harbor accommodations will be less hazardous.

Navigation at St. Paul, on the Mississippi, is open about eight months in the year, and this is the case on that river above the Falls of St. Anthony, as far as steamers have ascended, to the Pokegama falls, 150 miles nearly above Crow Wing. Above those falls a small steamer is now running to the Chippeway agency on Leech lake. Upon the Red river and upper Missouri the navigable season is from seven to eight months. A steamer is now running upon the lower portion of Red river. An improvement at the rapids near its mouth, and another on the Saskatchewan river, near its entrance into Lake Winnipeg, will afford a continuous river and lake navigation, including the lower portion of the Assiniboine, of nearly 2,000 miles in extent. The connection of the navigation of the Red river with that of the Minnesota branch of the Mississippi, which nature has so nearly effected that boats carrying one to two tons pass from one to the other

in the spring season, will not probably long be deferred. The Missouri river is now navigated by river steamers from its mouth to Fort Benton near the Grand Falls, a distance of 2,500 miles. Several of its branches in that distance are navigable to a limited extent. The Yellowstone branch, with some improvement at a few points, as the Bear rapids, Buffalo shoals, &c., can be rendered navigable for river steamers of the larger class to the mouth of the Bighorn and above. Its width in this distance, in its ordinary state, exceeds, on the average, one thousand feet, and while more rapid than the portion of the Missouri from the junction of the two to Fort Benton or the Grand Falls, its waters are clearer, and, according to Lewis and Clark, it has fewer moving sand-bars. The Missouri at Fort Union is broader and deeper than the Yellowstone, and there is a better navigation upon it to the Grand Falls than upon the Ohio river from Louisville to the mouth of the Great Kanawha. The Missouri above the Grand Falls can, it is believed, be improved for steamers to the Great Forks, or Gallatin City. Above that point is a bateau navigation on the western or Jefferson branch to its upper forks near the pass of Lewis and Clark.

Upon the Flathead and Clark rivers is a navigation for nine months of the year for small steamers, interrupted for boats ascending at only two or three points between the mouth of the Jocko and the falls twenty-six miles below the Pend d'Oreille lake.

Above the Jocko the navigation of the Flathead is interrupted by a fall of fifteen feet near the Flathead lake. By removing these obstructions or overcoming them by short canals with locks, which can be done at no very great cost, the navigation may be made continuous for 250 miles. Steamers are now running upon the lower portion of this distance. The navigation of the lower Columbia, which is never closed, has already been alluded to. From the White Bluffs to the sea it is only interrupted at two places—the Cascades and The Dalles, where are short railways for passing passengers and freight. Above the White Bluffs, although the current is generally strong, and there are interruptions at several places, yet the volume of water is large, and with suitable improvements the navigation may be extended northward for some distance into the British possessions. Upon the Lewis river, the main branch of the Columbia, steamers have ascended as far as Lewiston, at the mouth of the Clearwater.

The entrance to the Columbia river from the sea is now considered no more difficult than the entrance to New York harbor. At first, before the making of the coast surveys, extra insurance on vessels and cargoes was demanded, but now the case is different. At the other terminus in Washington Territory, no difficulty of this character exists. The waters connected with the strait of Juan de Fuca on the south are most remarkable in character. They are easy of access from the sea, are devoid of hidden dangers, have ample depth of water, and offer a number of harbors which are unsurpassed for marine and commercial purposes. One of these (Seattle) is assumed as the terminus of the main line of the road in the estimate of cost.

The strait of Juan de Fuca is very favorably situated for the Pacific trade. Its entrance is so broad that vessels have no occasion to lie off in the open sea waiting for a pilot or a favorable opportunity to enter it. It can be reached, as stated by navigators, often from Cape Horn in less time than San Francisco, although situated much further north, and is nearer than the latter city to Shanghai, the principal city of central China, by nearly five hundred miles, measuring upon the arc of a great circle of the earth, and this difference is still greater to the cities and ports of northern China and of Japan, and the mouth of the great river Amoor in Asiatic Russia. It is also nearer by 700 miles to our own newly acquired possessions in northwestern America—possessions, the commercial importance of which, as the future will show, will exceed any estimate yet put upon their value.

The voyage to the several places named can be made a coastwise one, in every

instance, without departing from a direct course, enabling steamers to lay in supplies of fuel and provisions when *en route*, and at our own ports, thus adding largely to the amount of the paying tonnage. Timber for ship-building is abundant, and near the assumed terminus at Seattle, and coal also is convenient, the mines being very near to tide-water. North of Seattle, at Bellingham bay, coal is mined in large quantities and passed directly to the hold of the vessel, the mines being in close proximity to tide-water. California is now being supplied with coal from this source, and with timber from Puget sound.

CLIMATE AND RESOURCES.

The probable revenue to be derived from the road when completed and in full operation is a question of importance. As in all similar cases, the revenue must come, aside from the land grants, from two sources, viz: from the local or way business, and from the through travel and transportation.

The value of the first must depend very greatly upon the climate and the fitness of the country for settlement. The former has been discussed, in part, when treating of the snows, and is illustrated by the isothermal lines upon the map, which in their course westward have a remarkable inclination to the north, showing, as is the fact, that the climate grows continually milder all the way from Lake Superior to the Pacific ocean, where it is not very dissimilar, in the latitude of 47° north, to that of the Chesapeake bay on the Atlantic. This great fact is worthy of especial note, and cannot be too deeply impressed upon the minds of those who desire to understand the climatology of the northern route to the Pacific.

As to the productiveness of this region, its agricultural resources and power, the fact of the great abundance of game found upon the plains and upon the mountain slopes, such as the buffalo, the elk, the antelope, the mountain sheep, and the deer, and the fact of its having been the chosen residence of the most populous and powerful of the Indian tribes, is proof conclusive of its superior capabilities for sustaining animal life.

Upon the high ground of the *Plateau du Coteau du Missouri*, and for a portion of the distance from the Grand Falls of the Missouri to the mountains, the soil is thin and gravelly, unsuited to culture; and between the first crossing of the Missouri and the Grand Falls of that river, are several tracts of varying width of what are termed "*mauvaises terres*," or *bad lands*. These extend southerly in the direction of the Black Hills to the sources of the Southern Shéyenne and White Earth rivers.

These portions, together with a tract of limited extent near the junction of Lewis river with the Columbia, comprise the inferior and seemingly worthless portions of the country traversed by the road. The remainder, excepting the portion which is mountainous, is either arable or suitable for grazing. There is, strictly speaking, but a comparatively small portion which is utterly worthless, and while the first-class arable lands do not perhaps comprise a very large portion of the whole, the great mass of them may justly be assumed as of medium or nearly medium quality.

Governor Stevens was of the opinion that of the whole distance from the Red river to Puget sound, only one-fifth part is uncultivable country. This one-fifth must be made up in part of the mountain ranges or highlands, whose slopes, being covered with timber, are more valuable perhaps than the arable prairie portions.

Dr. Evans, who accompanied Governor Stevens in his explorations, states that, by a careful analysis of samples taken in different places, the soil is found to contain all the elements needed for vegetation, and an unusual quantity of fertilizing matter. He also states that the arable lands can be cultivated without artificial irrigation; but in certain portions and seasons there are, doubtless, exceptions to this.

Governor Stevens states that there is moisture enough for profitable tillage on all parts of the route, and in proof points to the crops that have been raised in different places, from the Dalles of the Columbia to Fort Union on the Missouri, which show that in all that distance "there is ample rain to insure a certain crop." The portions adapted to grazing solely are undoubtedly the most extensive of the two, and the fact that the cattle and the horses do not require to be housed or fed in winter on the western portion, and only generally for a few weeks on the eastern portion when the cold is the greatest, makes it certain that it will be a great stock-producing and wool-growing region. The better lands yield liberal crops of the smaller grains, and potatoes, turnips, &c., and an early variety of Indian corn.

The latter, it is now well understood, is not well adapted to any portion of the Pacific slope. Even in California there is not heat and moisture enough combined at the proper season to bring it to perfection, the extremes of heat and cold not being as great as in the Mississippi and Atlantic States, where the mean annual temperature is the same. In Minnesota, however, and a portion of Dakota, and northward to the vicinity of Lake Winnipeg, the earlier varieties are cultivated without difficulty.

From Lake Superior to the James or Dakota river, and west of the Cascade range of high lands, the rains are abundant, the soil in general good, and the agricultural resources of both sections large. From the lake to the Coteau du Missouri, because of the level character of the surface, lakes and ponds are numerous to a very remarkable degree. These receive, and for a long period retain, the water from the clouds, and from them the moisture is slowly returned to the atmosphere, rendering it humid, and thus the vegetation is very greatly benefited.

Upon the great plain westward from the Dakota river to the mountains, the country is described by Governor Stevens as being as favorable for cultivation and settlement as upon the drier portions or steppes of northern Europe or southern Russia, which are considered very fair agricultural districts, and sustain almost as large a population, on the average, as is now found in the whole of New England. The Yellowstone valley, which was not visited by Governor Stevens, is described by others as exceeding in its agricultural capabilities the immediate valley of the Missouri to the north of it. Throughout the valley of the upper Missouri, including that of the Yellowstone, the rains are not infrequent, although not heavy, except occasionally.

In the region of the mountains, the successful culture of the soil by the population already gathered there, in the valleys of the upper tributaries of the Missouri and of Clark's river, proves very considerable agricultural power. In the valley of the Columbia, between the Bitter-root and Cascade ranges, the soil greatly varies. Along the western base of the former is a belt of excellent land. The remainder, being the larger portion, is well fitted for grazing, with the exception of about fifty miles near the mouth of the Snake river, where is a sand plain, having for its only verdure the artemisia or wild sage.

In respect to the productions of the soil in different latitudes, the theory that the greater stimulus of a tropical sun and abundant rains produces relatively more stalk and woody fibre than fruit, seems to be verified in the culture of wheat in Minnesota and in the valley of the Red river, where thirty-five to forty bushels to the acre, on the best land, is not an uncommon yield, and the weight per bushel is stated in official reports to be greater than that of wheat grown in the more southerly portions of the Mississippi valley. If this be true, then it would seem to follow that in the northern temperate latitudes, land of the same degree of fertility will produce the most relatively for the sustenance of men and animals, which may explain in part, perhaps, the flourishing condition of the race in those latitudes.

Such is the direction of the road and the character and relation to it of the country northward, within the British possessions, that a wide extent of the latter will necessarily be dependent upon it for the means of access to market. The explorations recently made under the authority of the British government disclose the fact that wheat is a good and reliable crop as far north as the northern limit of the Saskatchewan valley, five hundred miles north of the line of the Northern Pacific railroad, and that a wide belt of fertile country extends from the Red river and Lake Winnipeg by that valley all the way to the eastern base of the Rocky mountains.

The capability of this region, so far as its temperature and climate are concerned, is shown by the isothermal lines, already alluded to, on the map, three of which are given, two of them indicating the regions which have respectively the mean annual temperatures of forty degrees, and fifty degrees Fahrenheit, the former being the mean temperature of Vermont and New Hampshire and lower portion of Maine, and the latter of Pennsylvania and Ohio.

The third line designates the region which has a mean summer temperature of sixty-five degrees Fahrenheit. This latter, it will be observed, curves much more rapidly to the north than the other two, and explains the successful cultivation of Indian corn in the vicinity of Lakes Winnipeg and Manitobah. A line representing the northern limit of the growth of wheat would lie to the north of this all of the way to the mountains. The isothermal lines are not exhibited on the maps west of the mountains for the want of reliable information as to their position, but Mr. Waddington, in his recent paper on "overland communication in British America," states that west of the mountains those lines advance one degree of latitude northward for each two degrees of longitude westward. Wheat, as already stated, is cultivated as far north as latitude sixty on the Pacific coast.*

These facts show very conclusively that there is a vast region west and north-west of Lake Superior, capable of sustaining a very large population. Certain it is that in northern Europe, in a climate and under circumstances no more favorable than has been described, large populations have for centuries been supported. The region in question, reaching as far north as the latitude of fifty-four degrees on the east side of the mountains, and to sixty and sixty-five degrees on the west side, has, beyond question, a climate very favorable to health and animal life, and is capable of sustaining countless herds of cattle and of horses, and millions of sheep.

It is not to be supposed that what are now the most fertile portions of the Mississippi valley are to remain such. The rich prairies of that valley are slowly but surely, wherever cultivated, losing their productive power. It is not difficult to perceive, from the rapid increase in the population of the Union, which has averaged thirty-five per cent. for each separate decade since the first census was taken in 1790, and now averages nearly a million a year, that lands less productive than the rich lands of the Mississippi will ere long be in demand, and this demand will be experienced in its greatest force along the belt of country occupied by the Northern Pacific railroad. To the vast area which is to be benefited by this road must the country ultimately look for its supply of grain, of cattle, and of wool. The Atlantic States, and also Ohio, northern Indiana and Illinois, which will soon be manufacturing States, have a deep interest in this subject. Cattle, from the more remote portions of the region in question, will not probably be conveyed as now upon the hoof to eastern markets, but one of different modes of preserving their flesh by the use of refrigerator cars, or as suggested by Liebig and others, will be resorted to, and upon a large scale, and the product conveyed by railway; if not the entire distance, they will be thus conveyed to Lake Superior, where properly constructed vessels will, as soon

*Sitka, in latitude 57 degrees 3 minutes, has a mean annual temperature of 42½ degrees; the same with Montreal and Portland, Maine.

as navigation is opened to the Hudson, avoiding transshipment, bear it to the seaboard.

In the transportation of grain and other articles the navigation of the rivers will form powerful auxiliaries to the railway, which will bring it to the cheap navigation of the lakes, and create at the western extreme of Lake Superior a mart for the shipment of produce unsurpassed probably by any other in any part of the world.

This will be the nearest point for reaching lake navigation for the entire Rocky Mountain region and the country intervening as far south nearly as the latitude of 40° north. A line of railway leading eastward from the Platte valley, and connecting with the Northern Pacific road near the Dakota River crossing, will reach the cheap navigation of the lakes in about two hundred miles less distance than by any other more southerly route.

Of the agricultural resources and capabilities of the country in the vicinity of the northern route, and of the region more remote that will be tributary to it, all who have explored it speak in the most confident manner.

In its mineral resources it is not excelled by any other portion of the Union. The gold discoveries in Montana and Idaho and Washington and Oregon have already been alluded to. The two first named Territories are remarkable for the number and richness of the gold placers within their limits. It is found in gulches, and in ledges of great extent, several of which are indicated upon the map. In all the ranges from the Missouri to the Pacific it is found, but most abundantly in Montana. It is found in the mountains which stretch along the south side of the valley of the Yellowstone, and northward in the mountain region in that direction as far as that region has been explored.

Scarcely six years have elapsed since the cabin of the first white settler was erected in Montana, and the gold product of that Territory has not been less than forty millions. The estimate of the mining commissioner for the present year is, for Montana, \$12,000,000, Idaho \$6,000,000, and Oregon \$2,000,000. In Washington Territory gold is being mined in several places.

Silver is also found, and iron and copper and platinum. Upon the western slope of the Bitter Root or Cœur d'Alène range is a mountain of iron ore, (not to mention other localities where that ore is found,) exceeding in magnitude, as described by Dr. Evans, the famed iron mountain of Missouri.

Rev. Mr. Parker, a missionary to the Indians of Washington Territory, describes a large deposit of mineral or rock salt, pure and white, cropping out from the base of the mountain in the Salmon River valley, and saline waters, from which that article of commerce may be obtained, have been discovered near the source of the Shesnoye river, and at other places. West of the Cascade mountains coal is found and mined at different points all of the way from the Willamette valley to Bellingham bay, and is also being mined still further north in the same direction. It has also been found near the Cowlitz and Snoqualmie passes of the Cascades, and underlies the entire area from the Rocky mountains to the Mississippi, in the direction of the proposed road. This is a fact of the highest importance in a region much of which is greatly wanting in other resources for fuel. It has been discovered upon a tributary of the Minnesota or St. Peter's river and upon the Sauk river in Minnesota, and thence westerly upon most of the streams intervening to the mountains, from the Saskatchewan on the north to the Yellowstone and its tributaries on the south. Layers of it have been found near the surface having a thickness of twenty-five feet. The coal, thus spread almost broadcast over the country, is of the kind known as lignite. It is not equal to the anthracite of Pennsylvania or the best qualities of bituminous coal, but is adapted to all the purposes in the arts, and for navigation and locomotion, for which fuel is required. The existence of this immense field of lignite is considered as evidence that at a remote period in the past the same region was covered by a dense forest, indicating the adaptiveness of the

climate to the growth of timber, which now reappears on the more fertile portions, as the annual fires cease from the prairies.

It is perhaps unnecessary to pursue the subject of the local business of the proposed road. It will grow rapidly with the building of the road and after its completion. Interesting as the subject is in this respect, the road assumes very much greater importance when viewed in its true character as the main or leading thoroughfare between the Atlantic and Pacific oceans.

Two-thirds of the thirty-eight millions which now comprise the population of the United States, or of the forty-five to fifty millions which will compose it when the road is completed, are nearer by it, in time and distance, to the shores of Puget sound, or the mouth of the Columbia, than to any other part of our Pacific coast. It is not only the shortest line to the Pacific, for the major portion of the population of the Union, but it is superior in its alignment, having easier gradients, and passes through a more inviting country. For the four or five millions of the dominion of Canada it will be the only direct avenue to the Pacific and to the British possessions northwest of Lake Superior. In a military view as an auxiliary to the defence of the country, its position along our northern boundary is highly important, and is indispensable, in this respect, to our newly acquired possessions on the Pacific.

That portion of the Northern Pacific road which will connect the Pacific with the navigation of the Missouri river, having an estimated distance of seven hundred and fifty miles from Puget sound, or five hundred and thirty miles from navigation on the Columbia, or four hundred and eighty miles from the Lewis river at the mouth of the Paluse, upon the route represented upon the map, will be the medium for supplying, in the cheapest manner, the population of the valleys of the Missouri and the Mississippi with the productions of eastern Asia, and of the entire country on both shores of the Pacific north to the Arctic sea. These productions, during the season of navigation, will, very many of them, be conveyed down the Missouri in steamers adapted to its navigation, or upon arks or rafts of lumber, as exemplified in former days on the Alleghany and Ohio rivers from Olean and Pittsburg and other points. By the latter mode the cost of transportation will be merely nominal, giving to this mode of supplying the valleys of the Missouri and Mississippi with the productions named the superiority in cheapness over all others. The period when this will take place cannot be very distant, and will follow close on the completion of the western portion of the road. The pineries of Wisconsin and Minnesota are not as extensive as is supposed by many, and they are rapidly being exhausted. The loss is not restored by a new growth; other sources must be resorted to for a supply, and these will be found in the mountain region at the head of and northwest of the Missouri, and from the Pacific slope in the vicinity of and north of Puget sound.

The contributions to the business of the road from the Pacific cannot easily be overrated. The territory recently acquired from Russia will add very largely to its revenue.

All that portion of this territory near to the Pacific is rich in lumber and minerals, with a climate not unfavorable to settlement for their development and for other purposes. This is true also of the Alaska peninsula and Aleutian chain of islands, stretching onward towards Japan and China a distance of about 1,200 miles, making, with the main land, a coast line of nearly 3,000 miles within our own territory, enriched by fisheries, which in value, it is believed, will vie with those of Newfoundland, which for centuries have fed the nations of northern Europe.

The Atlantic and Middle and Northern and Northwestern States, and the Confederated British Provinces, will contribute very largely to the business and support of the road. Their ultimate probable dependence upon it for the staples of life has already been explained. Enough is known of the geography and

topography of Western British America to make certain that the Northern Pacific railroad cannot be rivalled by any trans-continental line in that direction. The route described by Mr. Waddington, in his paper referred to, is greatly inferior. The travel and business upon the road must be very large from the several sections named, because of their commercial character, their large and increasing and industrious populations, and the numbers they will contribute to the settlement of the country traversed by the road and along the Pacific coast. The movement of the population produced by it will be without a parallel. Through its instrumentality is to pass the intelligence which is ultimately to direct the labor of the densely populated region of eastern Asia and the islands of the Pacific, and regenerate these portions of the world, giving to them a civilization not inferior to our own.

When the road is completed and in successful operation, the time required to reach the Pacific coast by means of it from New York city will not exceed about four days, allowing an average rate of movement of thirty miles an hour. Thence to Shanghai, in China, the voyage will occupy eighteen to nineteen days, at the mean rate of twelve miles per hour, making twenty-two to twenty-three days in all from New York, a less time from the latter city than is now occupied in making the voyage by the way of the Isthmus to San Francisco. This period will be further materially lessened when a line of railway shall be carried northward, as it is, very sure to be, along the Pacific coast, and a greater rate of movement than thirty miles per hour from New York city is effected.

With a road built and equipped and operated in the best manner, over the favorable ground of the Northern Pacific route, ground which contrasts more favorably with routes to the south of it (not considering the great saving in distance) than does the Mohawk Valley and Lake route with the more southerly routes leading to the west over the Alleghanies, it is not easy to compute or predict the business that will be done upon it.

The European and transatlantic travel, because of the commercial relations of all parts of Europe with eastern Asia, and the fact that the population of Europe, located near the north Atlantic, numbers over one hundred millions, or nearly treble that of the United States, must be very great.

From London or Paris, supposing the Atlantic passage by steam to be made at the rate assumed on the Pacific, and the journey to Shanghai will be accomplished in thirty-two days, which will be reduced to twenty-seven days when a continuous line of railway is completed from New York to Halifax, or the Gut of Canso on the most direct route, and the extension along the Pacific coast and improvements in speed already alluded to are effected.

By the same mode of reckoning it now takes about twice the last number of days to reach the same point from the cities named, by the route of the Red sea and the Indian ocean. A similar difference, but less in amount, will be made in the travel from the same cities to Australia.

In considering the question of revenue, no attempt will be made to exhibit by figures what it probably will be, even for the first few years after the opening of the road. The fact has been stated that the most numerous and powerful of the Indian tribes are to be found in the vicinity of the line of the road, a consequence, as stated, of the superior capabilities of the country for their support. These tribes, by reason of the rapid settlement of the country, the disappearance of the game, and the rude treatment they will be too likely to receive, will become more or less hostile, demanding the maintenance of a more than ordinary military force, by which the government will become, during the first years of the operation of the road, a large contributor to its revenue. That this must be a large item, it is necessary only to consult the records of the War Department in reference to the protection demanded by the line of railway now in progress by the Salt Lake route, and to understand that upon that route and in its imme-

diate vicinity, between the Missouri and the Pacific, before the present Indian troubles commenced, there were some forty or more military posts.

The conveyance of the mails will form a very large item in the revenue of the road. These will consist, in addition to those of our own government, of the European, and Asiatic, and Australian mails, from England, France, Belgium, and Germany, &c., including the British North American possessions.

The transportation of express matter, or matter paying the highest rates of transit between the countries named above, will also be an item of more than ordinary magnitude. The silks and other articles from China and Japan will come under this list. All merchandise, moving in either direction, that would suffer from a tropical passage, or in the conveyance of which a saving in time is important, will seek the railroad. All these are most important and reliable sources of revenue to the Northern Pacific road. No other route can come in successful competition with it in the transportation of the mails, &c., referred to between the countries named.

As to other sources of revenue and the general business of the road, both will doubtless exceed any present estimate or anticipations as to their amount. It can with truth be stated that upon all the railways hitherto constructed, the business transacted upon them has very greatly exceeded, even within the first few years of their operation, the estimates previously made; and if some have failed to meet expenses, it has been because the latter were underrated; but this failure has generally only been for a season, for a short period, comparatively, in the lifetime of the roads.

In naming the different sources of revenue, that to be derived from the land grant should not be omitted, for while the land in the vicinity of the road is much of it less valuable than is to be found in the vicinity of land-grant railways in the Mississippi valley, the revenue to be derived from it will doubtless aid largely in defraying the cost of the road, which will be greatly increased by the probable inability of the country through which it passes, from not being sufficiently settled and improved, to furnish support, for the time being, for its rapidly increasing population.

It is susceptible of proof that the farm lands alone, omitting village and city property, within fifteen miles of such railroads as have been constructed and put in operation east of the Mississippi have been increased in value by reason of the roads to an amount in the aggregate exceeding the cost of the roads.

Upon the line of the Northern Pacific road this great benefit will be shared equally by the company and the government in the enhanced value of the lands owned by each respectively, and the latter will moreover be greatly benefited by the addition it will make to the military strength and the taxable wealth of the country. Viewed in this light alone its construction becomes a measure of sound policy to enable the country the better to bear or to relieve itself of the burden now pressing upon it. To realize this benefit no advance of capital is needed or asked for; all that is desired is the loan by the government of its credit for a limited period to the extent granted to other companies. Such a loan is essential to the success of the enterprise, and is claimed under the rule of equal and exact justice, and because a very much greater portion of the population of the Union, a portion which produces relatively, according to its numbers, the most exchangeable wealth, are more directly and more deeply interested in the construction of the Northern line to the Pacific than in any other.

A probable source of revenue to the road not yet noticed is the telegraph line authorized by the charter and included in the estimate of cost. This line is an indispensable appendage to the road, and will form from its position a portion of the great line projected to unite the American and Asiatic continents and northern Europe. It is reasonable to suppose that it will prove a source of profit to the company, over and above the benefit to be derived from it in the

operation of the road. It will be a source of profit to the country also in its salutary influence in moderating charges upon the transatlantic line now in operation, and upon other trans-continental lines.

In view of all the facts and circumstances relating to the project in question, the conclusion is unavoidable that the Northern Pacific railroad, in its true character as a *world's highway*, will when completed be without a parallel on the continent, and without a competitor that can impair its value; that it will do ultimately a very large business, a business so large as to cause a reasonable doubt as to the adequacy of the estimate of outfit, even in the first year or two of its operation throughout—an estimate which, if it be too low, the company will be prompt and able to correct, because financially it will be growing stronger by so doing.

To return now for a moment to the subject of the character of the country to be traversed by the Northern Pacific railroad: the more thoroughly it is investigated the stronger is the conviction of its general suitability for settlement, and of its superiority in this respect over any belt of country of equal width situated further south, within the boundaries of the United States.

Governor Stevens, who re-examined a large portion of the route on his visit to the Indian council at Fort Benton in 1855, speaks in his final report, rendered in 1860, with more confidence than in his first report, of the value of the country for settlement. He states that with few exceptions the portions which are not well adapted to culture are suitable for grazing, with no deficiency of water that cannot in some way be supplied. Lieutenant John Mullan, who spent several years in explorations of the mountain region, and who constructed a military road from Walla-Walla to Fort Benton, concurs generally in the character of that portion of the country as described by Governor Stevens.

The late Dr. Evans, in an unpublished report, says that "150 miles is the widest belt of country immediately upon the line of the road unsuited for settlement." He also gives the opinion, as elsewhere stated, that the arable lands do not in general require artificial irrigation; and it may be added, that the loss of fertilizing matter from the soil by the washing of the rains will be much less than in other sections, where the rain-fall is greater. This loss upon the Atlantic slope is doubtless very great, and the productive power of the country is in consequence lessened to a far greater degree than is generally supposed. An amount of rain-fall over and above what is necessary for vegetation is not desirable, unless the hydraulic power it furnishes more than compensates for the loss of productive power in the land.

If the spaces occupied by the *mauvaises terres* of the upper Missouri and the Yellowstone, the dry and gravelly *plateau du Coteau du Missouri*, the Cactus plain of the Sun and Dearborn rivers, and the Sage or Sand plain of the Columbia, were covered or occupied by rocky elevated ridges, the country upon the line of the Northern Pacific railroad would be more nearly like New England, although even then not as mountainous. There may be in New England a less proportion of waste or unproductive land, but, because of the rugged and mountainous character of its surface generally, the cost of building and operating a system of railways within its borders will be greater than within the limits of the belt of country to be traversed by the Northern Pacific railroad.

Dr. F. V. Hayden, whose extensive knowledge from actual exploration of the Rocky Mountain region and the valley of the Yellowstone, and high standing as a geologist, render his opinion of very great value, remarks in a letter to me of 3d December ultimo, that he considers the northern route as by far the most desirable one for a railroad.

In a memoir on this subject published in 1853, to which reference is made for many important facts and statements bearing upon this subject, (statements the more valuable because given without prejudice or bias in favor of any particular route for the road,) I ventured the opinion that "upon the Columbia or upon

the waters of de Fuca will yet arise the Queen City of the Pacific. Wherever that emporium is to be, whether at the mouth of the noble Columbia, or on one of the beautiful bays that open out upon the strait of de Fuca, a high destiny awaits it." Subsequent investigations, and a more accurate knowledge of the entire country, strengthen the conviction of the correctness of this opinion. Governor Stevens states that the waters of Puget sound form "a great inland sea, unsurpassed on the shores of all the oceans for the purposes of commerce;" that "these waters, in connection with those of the Columbia and the main coast of the Pacific ocean north of the Columbia, and the adjacent country, are a second New England, having all the elements for a great variety of pursuits, and for a most extensive commerce." From these waters, and from those to the northward, which will be whitened by the sails of our hardy fishermen, will come forth the seamen who are to man the commercial and military marine of the Pacific ocean. From this great nursery will yet be built up a maritime power which no similar power or combination of powers on the Atlantic can overshadow; a power which will pour into the lap of the nation unmeasurable wealth, and give to eastern Asia and the islands of the Pacific ultimately a better than European civilization.

Lewis and Clark, of whom mention has several times been made, were the first to explore the country from the Great North Bend of the Missouri to the Pacific ocean. They spent two years in this service, going and returning, and were deeply impressed with the value of the country for settlement.

President Jefferson, who penned the introduction to the published narrative of their expedition, and whose private secretary Captain Lewis had been, speaks of the implicit reliance to be placed in the truthfulness of their statements, and of their trials in their endeavors to bring to the knowledge of the public "*that vast fertile country which their sons are destined to fill with arts, with freedom, and with happiness.*"

This prophecy of that clear-sighted statesman is destined, it would seem, to an earlier fulfilment than even he anticipated. In no portion of our country, so wonderful for its rapid growth, have greater changes been effected in the same time, than have taken place within the last few years in the Territories and States to be traversed by the Northern Pacific railroad.

In conclusion, I would state that in the preparation of this report, and the accompanying map, in addition to the names mentioned therein, I have availed myself of the valuable map of Colonel W. F. Reynolds, who was for two years or more engaged in making a government exploration of the valley of the Yellowstone, and the region south. I have consulted, also, the excellent map of western Montana and Idaho, by Captain W. W. De Lacy, and have been favored by Dr. George Sukely, who accompanied Governor Stevens, with his map of Clark's river, and journal of his passage down that river and the Columbia.

I am also indebted to Major Generals Pope and G. K. Warren, both of whom have made government explorations of portions of the region in question, and to Professor George Gibbs and Mr. G. C. Gardner, of the northwestern boundary survey, and to several others.

Respectfully submitted:

EDWIN F. JOHNSON,

Engineer-in-Chief of the Northern Pacific Railroad.

NEW YORK, November, 1867.